Ontario

Advisory Council on Occupational Health and Occupational Safety

Eighth Annual Report
April 1, 1985
to March 31, 1986

Volume 1

87-01934/

Mandate and Objectives

The function of the Advisory Council is and it has power to*:

a) make recommendations to the Minister of Labour relating to programs of the ministry in occupational health and occupational safety; and
b) advise the minister on matters relating to occupational health and occupational safety which may be brought to its attention or be referred to it.

To achieve this Council has set the following objectives:

Primary Objective
To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary Objectives
1. To ensure as far as possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as possible that there is appropriate manpower training and development for the occupational health and safety field.
5. To review periodically the effectiveness of the policies and programs implemented to achieve objectives 1 to 4. **

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*The Occupational Health and Safety Act, s 10(7).
**added June, 1980.

Advisory Council on Occupational Health and Occupational Safety

Eighth Annual Report
April 1, 1985 to March 31, 1986

Volume 1

**400 University Ave.,
15th Floor,
Toronto, Ontario
M7A 1T7**

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Advisory Council on
Occupational Health &
Occupational Safety

Ontario

Conseil consultatif
de la santé et de la
sécurité au travail

Office of the
Chairman

Bureau du
président

May 29, 1986

The Honourable William L. Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Sir:

I am honoured to submit the Eighth Annual Report of the Advisory Council on Occupational Health and Occupational Safety for the fiscal year 1985-86.

Respectfully,

D. R. McCalla
Chairman

Encl.

Advisory Council on Occupational Health and Occupational Safety Members and Officers 1985-86

R. T. Boldt (1988)
Dow Chemical Canada, Inc.
(retired)
Sarnia

T. Byrne* (1988)**
Prov. Bldg. & Constn. Trades Council
Etobicoke

N. Caldbick (1986)
Housewife
Timmins

J. W. Charters (1985)
Steel Company of Canada
Ha[illegible]on

D. Dewees (1987)
University of Toronto
Toronto

J. Duffy (1985)
Prov. Bldg. & Constn. Trades Council
Don Mills

R. Falconer* (1988)
United Steelworkers of America
Toronto

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Fisher Farms
Burlington

J. Gill (1988)
United Automobile Workers
North York

L. Heard*** (1986)
United Steelworkers of America
Toronto

E. Kaegi† (1987)
C-I-L
North York

D. R. McCalla (1987)††
(Chairman)
McMaster University
Hamilton

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Ontario Federation of Labour
(retired)
Toronto

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University of Western Ontario
London

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(retired)
Southampton

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Campbellville

T. O'Connor (1986)
Canadian Union of Public Employees
Scarborough

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(retired)
Desbarats

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Ellis-Don Ltd.
London

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(Vice-Chairman)
University of Toronto
Toronto

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London

E. A. Waddell (1986)
Ontario Federation of Labour
Don Mills

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Toronto

J. L. West* (1988)**
University of Windsor
Windsor

V. Biggar
Executive Assistant to the Chairman

P. L. Chan
Research Officer

A. J. Koven
Project Officer

G. Perry
Research Officer
(to October 11, 1985)

S. Spencer
Research Officer
(from February 10, 1985)

N. R. Subramanian
Administrative Assistant

Members' terms expire(d) on October 31 of the year indicated in parentheses except where indicated

* *Appointed effective December 11, 1985*
** *December 10*
*** *Membership revoked effective September 30, 1985 (appointed to Workers' Compensation Appeals Tribunal)*
† *Membership revoked effective December 10, 1985 (appointed to board of directors of the Workers' Compensation Board)*
†† *January 31*

Preface

The Advisory Council on Occupational Health and Safety has now completed its eighth full year of operation and is grateful to a great many individuals, groups, and organizations concerned with health and safety at work for their participation and contribution during the year.

1985-86 saw the completion of a major phase of council's study of joint health and safety committees in Ontario. The survey, a major collaborative effort that was briefly described in the introductory section of last year's annual report, was carried out by a consultant under the auspices of council. The consultant's report to council on the survey appears in Volume Two of the council's Eighth Annual Report. Council is presently undertaking its own review of the survey findings and the consultant's report and in due course will be submitting its report and recommendations to the minister. The extensive data generated in the survey is expected to provide a valuable basis for further investigation by council, the ministry, and others concerned with health and safety in the workplace.

In October, 1985 council held a workshop on biotechnology and invited speakers from academia, labour, management and government to discuss the science of biotechnology, its potential applications, issues and concerns of the various parties, and what is being done to address the issues. Proceedings of the workshop appear in Volume One of the Eighth Annual Report. Council is presently formulating its advice on biotechnology for submission to the minister in the coming year. The introductory section of this year's annual report, highlighting biotechnology, reflects briefly on challenges in the occupational health and safety area that arise out of technological change.

Council's advisory memoranda submitted to the minister during the fiscal year, together those responses that have been received from the minister, make up the first main section of Volume One of council's annual report. This year five advisory memoranda, oultlined below, were submitted.

In the previous fiscal year, council formed a Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace. Following the deliberations of this group council developed Advisory Memorandum 85-I: *Criteria and Alternative Approaches to the Control of Hazardous Substances and Agents in the Workplace: Part I – Identification of Criteria*. This memorandum represents the first part of council's advice to the minister on this topic and outlines an approach to setting priorities for further investigating hazardous substances. In the course of deliberations a fundamental need for workplace control programs was recognized and lead to the development of council's Advisory Memorandum 85-IV: *Workplace Control Programs*. During the coming year, council expects to be submitting its advice on alternative approaches to the control of hazardous substances and agents in the workplace.

The other advisory memoranda relate to health surveillance and to council's review of the process used by the ministry in the development of proposed designated substance regulations. Advisory Memorandum 85-II: *Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs* sets out a classification framework and process concerning the selection of procedures for inclusion in biomedical surveillance programs in Ontario workplaces. Advisory Memoranda 85-III and 85-V deal with council's review of the process used in the development of the proposed regulation respecting asbestos on construction projects and building and repair operations and the proposed arsenic regulation, respectively.

Following council's advisory memoranda and proceedings from the biotechnology workshop, Volume One of the annual report includes follow-up correspondence concerning previous advisory memoranda and council's correspondence with the minister on other issues. The follow-up correspondence includes the minister's responses to the previous advisory memoranda:

- 83-IV *New Chemical and Biological Agents in the Workplace: Identification and Control of Carcinogen and Potential Carcinogens;*
- 84-II *Concerning Reproductive Hazards in the Workplace;* and
- 84-IV *Concerning Policies and Priorities for Dealing with Literacy and Occupational Health and Safety.*

The final section of Volume One contains administrative matters. The advisory council is governed by section 10 of the *Occupational Health and Safety Act*, which has been reproduced in full for easy reference. The council's objectives and terms of reference are also set out in this section as well as dates of council meetings and the terms of reference, membership and meeting dates of its task forces.

An appendix at the end of Volume One of the report contains a variety of statistics, including: the number and frequency rate of compensated occupational fatalities, major disabilities, injuries and illnesses; days lost for compensated temporary total disability; compensated injuries and days of total temporary disability by detailed Standard Industrial Classification; and distribution of disabling injuries for Ontario and Canada. Council is grateful to the Occupational Health and Safety Division of the Ministry of Labour; the Workers' Compensation Board of Ontario; and the Canadian Centre for Occupational Health and Safety for the provision of these statistics this year.

Council is indebted to the non-council members of council's task forces and the technical advisory committee for the survey of joint health and safety committees, who were appointed to contribute their expertise on particular issues, for their invaluable assistance. Council also expresses its gratitude for the support and co-operation it has received from members of labour and management, including worker and management members of joint health and safety committees, and from private and public associations and agencies, including educational institutions. Without their continuing support council would not be in a position to fulfill its responsibilities.

Special thanks is also due to those council members whose terms expired in October 1985 for their participation in council meetings through to February pending the appointment of new members and reappointment of members to council.

Dr. Jim Charters and Mr. Peter Fisher retired from council on the expiry of their terms after eight years. Mr. Lorne Heard, who was appointed to the Workers' Compensation Appeals Tribunal, left council after almost nine years as a member of council. Council is grateful for their commitment and years of invaluable service. Mr. Joe Duffy retired from council on the expiry of his term after serving for four years and eight months, and Dr. Elizabeth Kaegi left having served on council for four years and four months – both members having been appointed to the board of directors of the Workers' Compensation Board of Ontario. Council thanks them for their valued contribution and wishes them well in the future.

Four new members joined council in 1985/86. Council welcomes the appointment of Mr. Trevor Byrne, Mr. Roger Falconer, Mr. Gerry Nipshagen, and Ms. Leigh West.

Ms. Gareth Perry, a member of council's staff, has moved to a new position in the Ministry of the Solicitor General. Her contribution to council's work was greatly appreciated.

INTRODUCTION

Technological Change and Occupational Health and Safety Challenges

Technological change over the past few centuries has changed the face of the world and the ways in which humans live and work; and the rate of change seems to accelerate with each decade. While these changes have resulted in tremendous improvements in life expectancy and standard of living, unanticipated side effects have caused death and suffering. Workers, who frequently receive more exposure than the general public, have borne more than their share of the risks. Sometimes, even when there was evidence that a serious hazard might be associated with a particular technology or substance, the response of the authorities has been one of denial rather than one of quick action to deal with the problem. The experience of asbestos workers in many countries, including Canada, provides a dramatic illustration of this point.

While our technologies are becoming increasingly more complex, we should be in a position to apply knowledge acquired from the previous experiences to help minimize the impact of new problems and hazards. The question is, do we, as society, have the will to obtain and apply the knowledge necessary to provide an appropriately high degree of protection to workers or will pressures to innovate, produce and compete be so overwhelming that a new technology will be assumed to be safe unless it causes an epidemic. Will our response time change to provide fast and reliable action when new knowledge indicates the need for new safeguards?

In the introduction to its fifth annual report, council suggested ways in which new technology could be used to solve occupational health problems by using robotics and artificial intelligence to replace humans in hazardous situations. While such 'high tech' approaches will undoubtedly provide solutions to some of the problems, they will bring their own hazards. Continued attention to all aspects of occupational health and safety is needed.

Over the past year council has given attention to a wide range of topics involving both old and new technology. These are briefly described in the preface and reported in full in the body of this report.

While an assessment of existing technology can be made in the light of our experience with the substances or processes used, this approach is not possible for assessing new technology since there is little or no workplace experience on which to draw. In this situation it is necessary to make the best possible use of the results of animal experiments and laboratory tests and any other available data. In its advice to the minister on new substances and agents in the workplace (Advisory Memorandum 83-IV) council recommended a system that would require the testing of new substances before they are introduced into the workplace.

The problems that will arise from the use of radically new technologies, such as modern biotechnology, are particularly difficult to anticipate. While many aspects of biotechnology (the industrial use of biological processes) such as fermentations are well established, recent developments in molecular and cell biology have opened a new era.

This new era for biotechnology began with the discovery of several new techniques that allow man to change biological processes in new ways. Recombinant DNA techniques allow changes to be made to biological systems by the insertion of segments of DNA (genes). The value of this technique has been enhanced by the ability of scientists to identify, transfer and even synthesize specific genes. The technique can be considered roughly analogous to a person operating a word processor – instructions can be used to add or rearrange words, sentences or paragraphs or to insert them into other documents.

In the case of recombinant DNA technology, the 'documents' are the instruction manuals of the cells, i.e. the genetic code. Many people who know that the result of the cell following its instruction manual is life, and that mistakes in the manual (genetic defects) can cause disastrous effects, are concerned about the consequences of genetic manipulation. However, it is widely recognized that the use of these techniques will lead to a better understanding of how the expression of genes is controlled.

Other new techniques, such as cell fusion, plant cell cultures and gene transfer, also allow man to change the 'natural' characteristics of various biological systems.

The importance of manipulating biological systems to develop improved strains of plants and animals has long been recognized. Plant and animal breeding are methods that have been used in the past. However, these traditional techniques are not specific. The application of new biotechnology allows man to specifically modify the existing biological systems and to expand the application of biological systems into new processes and products.

Examples of these include:

1) instructing bacteria or other simple life forms to produce large quantities of complicated organic molecules that have previously been difficult or impossible to synthesize in the laboratory – substances like growth hormone, insulin, interferon, renin and certain enzymes. These products have enormous potential value in medicine (diagnosis and treatment of disease), agriculture (stimulate growth of animals), food production (use of renin in cheese), and in consumer products (enzymes in detergents).
2) developing improved varieties of animals and plants. The conventional techniques of animal and plant breeding can be speeded up and made specific for certain 'favourable' characteristics.
3) changing the genetics of organisms so that they can:
   - degrade toxic chemical wastes;
   - extract metals from complex ores;
   - infect and destroy insect pests (such as spruce bud worm);
   - prevent frost damage to plants;
   - enhance nitrogen fixation, as well as
4) altering conventional processes, i.e. improving or enhancing mineral leaching and pest control.

In 1984 the federal government identified biotechnology as a strategic initiative, and considerable time, effort and money are being invested in developing the commercial application of biotechnology in Canada.

Council recognizes that the potential for development is enormous, but also recognizes that it is very difficult to predict what specific hazards to humans or the environment may develop. Against this background, and with the encouragement of the Ministry of Labour, council, in October 1985, hosted a workshop and invited speakers from academia (scientists and philosophers), labour, management and government to discuss the science involved in biotechnology, its potential applications and their concerns and to describe what is being done at present to address the issues. Many of the points discussed at the workshop are common to many aspects of occupational health and safety, e.g. the need for general precautions and the need to communicate and apply what is known about the potential hazards. Other points pertain more specifically to new technologies, e.g. the lack of data, the uncertainties and how to estimate the hazards before adverse health effects are demonstrated.

Dr. Mustard, (Canadian Institute for Advanced Research) former chairman of ACOHOS, in his opening address to the workshop, focused on whether or not lessons from the past can be used to prevent disasters in the future. He stressed the importance of protecting humans from exposure to substances and agents that are likely to cause adverse health effects and suggested the use of robots and sophisticated new mechanical technology as examples of means of avoiding human exposure.

Mr. Mazzocchi (Workers Policy Unit) pointed out that, at its current stage of evolution, biotechnology presents regulatory agencies with an opportunity to help guide the development of a new and potentially hazardous technology rather than the obligation to relegate it as an 'after the fact' emergency response to an acute occupational or environmental problem. In this respect, genetic engineering represents a great unknown with which there has been little experience.

Dr. Evans (Allelix Inc.) stressed the importance of protecting workers and the public from real hazards or a realistic potential for hazards, not imaginary hazards exaggerated by both the media 'hype' and the fear of the unknown that surrounds new inventions, especially those capable of interfering with life and its basic processes.

Mr. Gilhooly (Environmental Law Reform Commission) pointed out that if the general public fails to accept a new technology, or if public fears become too high, the development of the technology and its applications could be severely restricted or the cost of protection will price it out of the marketplace. The proceedings of the workshop are published in Volume One of this annual report.

As a consequence of the workshop and subsequent discussions, a council task force was established to examine the issue of precautions needed to protect workers in this important developing area. The group will address such specific questions as: What risks can be expected?; what regulations are now in place that can be used to control these risks?; are new regulations (or approaches to regulations) needed?; how can information be effectively disseminated to the affected parties, including ministry inspectors?; how should the efforts of various ministries and jurisdictions be co-ordinated so that there is minimum duplication of effort and so that the regulations are compatible with those of other Canadian jurisdictions and harmonized with our major trading partners?

The work of this task force will take council into new areas and cause it to grapple with the basic principles behind a new and sophisticated industry and also with questions concerning ways and means of anticipating hazards and responding to them without awaiting confirmation in the form of effects on human health. As well as being directly applicable to biotechnology, much of this work should be relevant to other emerging technological processes.

COUNCIL'S ADVISORY MEMORANDA

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

Office of the
Chairman

Bureau du
président

400 University Avenue
Toronto, Ontario
M7A 1T7

416/965-2448

May 28, 1985

The Honourable R. G. Elgie, M.D.,
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. Elgie:

On behalf of the Advisory Council I am enclosing Advisory Memorandum 85-I. This Advisory Memorandum constitutes the first part of council's advice on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace. It outlines an approach to setting priorities for further investigating hazardous substances.

Subsequent advisory memoranda will identify alternative approaches for controlling substances in the workplace and list the detailed information required to determine the most appropriate control strategy for specific substances or groups of substances.

I hope that the principles, policies and procedures described in this document will be of value to you in your exceedingly difficult task.

Yours truly,

D. R. McCalla
Chairman

Encl.

c.c.: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Advisory Memorandum 85-I
to the Minister of Labour
May 28, 1985

Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace:

Part I – Identification of Criteria

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- B) Risk Evaluation

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Recommendations

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Recommendations

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SUMMARY

This paper is Part I of council's advice on 'Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace'. It deals with the process of assigning priorities for the further investigation of substances that are likely to pose a risk to the health of Ontario workers.

The premise of the paper is that substances posing the greatest risk to the health of workers should be controlled first. Hence the process commences with the identification of substances that may pose a risk to Ontario workers and continues with a simple scheme for estimating the order of magnitude of the aggregate risk presented by each substance. The impact of the risk on human life and health is considered along with the number of workers likely to be affected (the magnitude of the risk in Ontario) to determine the greatest aggregate risk and hence the highest priority. Although the process assumes adequate data are available, means of dealing with inadequate or uncertain data are suggested. There are recommendations for the systematic collection of essential data, i.e. information on substances used, the number of workers exposed and the nature of exposure.

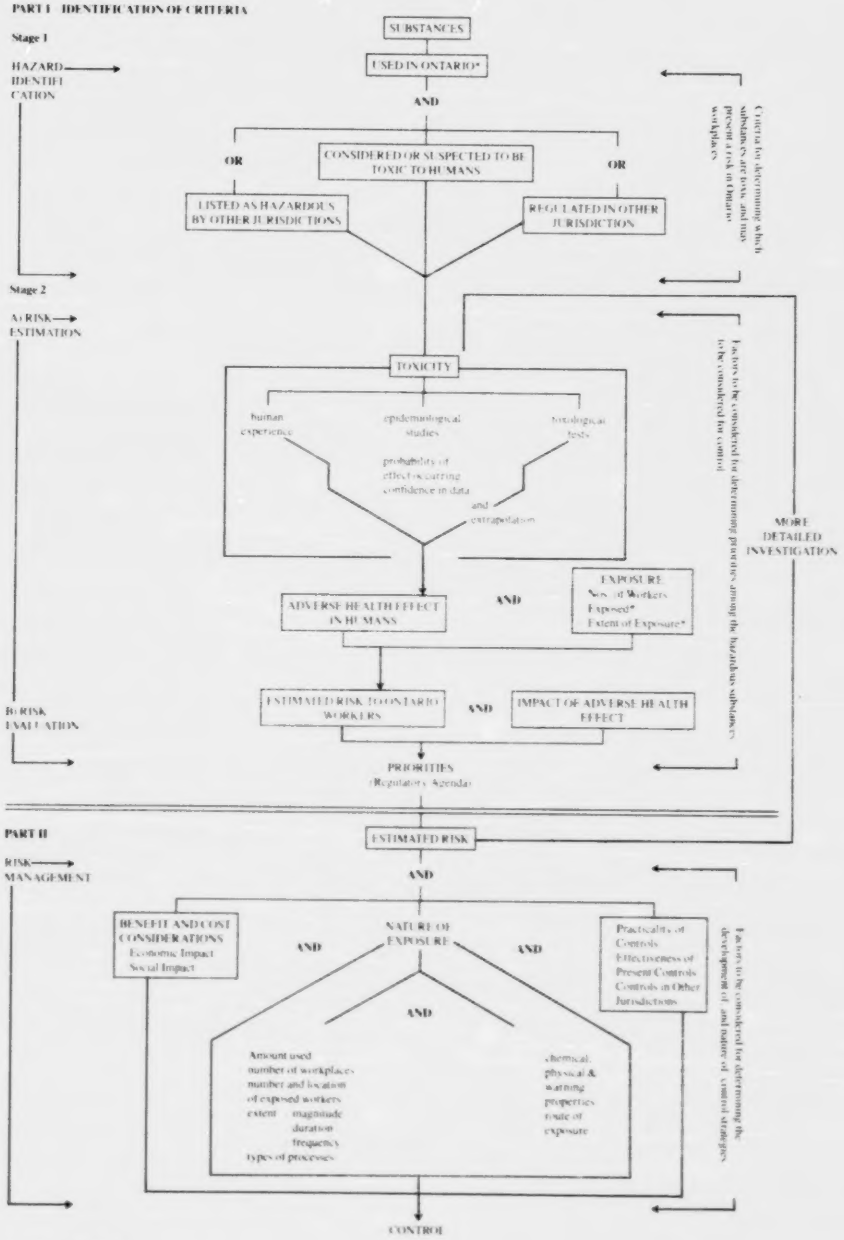
The value of the scheme is that it can be applied even when the data available are inadequate, and modifications can be made when better or more extensive data become available.

It is recommended that a priority list of substances, identified for further investigation, should be published and updated annually to provide an opportunity for public input.

Subsequent advisory memoranda will identify alternative approaches for controlling substances in the workplace and list the detailed information required to determine the most appropriate control strategy for specific substances or groups of substances.

The criteria, factors to be considered and the organization of the advisory memoranda are illustrated in Figure 1.

Figure 1. Organizational Chart of the Document and Summary of the Criteria


PART I – IDENTIFICATION OF CRITERIA
Stage 1
HAZARD IDENTIFICATION
SUBSTANCES
USED IN ONTARIO*
AND
OR
CONSIDERED OR SUSPECTED TO BE TOXIC TO HUMANS
OR
LISTED AS HAZARDOUS BY OTHER JURISDICTIONS
REGULATED IN OTHER JURISDICTION
Criteria for determining which substances are toxic and may present a risk in Ontario workplaces
Stage 2
A) RISK ESTIMATION
TOXICITY
human experience
epidemiological studies
toxicological tests
probability of effect occurring confidence in data
and extrapolation
Factors to be considered for determining priorities among the hazardous substances to be considered for control
MORE DETAILED INVESTIGATION
ADVERSE HEALTH EFFECT IN HUMANS
AND
EXPOSURE
Nos. of Workers Exposed*
Extent of Exposure*
B) RISK EVALUATION
ESTIMATED RISK TO ONTARIO WORKERS
AND
IMPACT OF ADVERSE HEALTH EFFECT
PRIORITIES
(Regulatory Agenda)
PART II
RISK MANAGEMENT
ESTIMATED RISK
AND
BENEFIT AND COST CONSIDERATIONS
Economic Impact
Social Impact
AND
NATURE OF EXPOSURE
AND
Practicality of Controls
Effectiveness of Present Controls
Controls in Other Jurisdictions
Factors to be considered for determining the development of and nature of control strategies
AND
Amount used
number of workplaces
number and location of exposed workers
extent – magnitude
duration
frequency
types of processes
chemical, physical & warning properties
route of exposure
CONTROL

Alternative Strategies

1 BAN OR SUBSTITUTE
2 LICENCE – USE BY PERMIT ONLY
3 REGULATION
  A) ALL COMPONENTS (CONTROL LIMITS OF EXPOSURE AND ASSOCIATED CODES)
  B) SOME COMPONENTS
4 MANDATORY WORKPLACE CONTROL PROGRAMS
  FOR ALL SUBSTANCES
  LEVEL OF CONTROL VARY WITH DEGREE OF RISK AT EACH WORKSITE
  COMPONENTS SPECIFIED

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* Information required to determine priorities which is specific for Ontario.

INTRODUCTION

Statement of the Problem

Workers are exposed to a variety of chemicals and agents in the workplace. It has been estimated that 80 per cent of these have not been tested in the laboratory to determine their toxicity[1]. Some of the substances are new, others have been in use for generations. Much of the information that is available has been gained from experience, i.e. when adverse health effects have been observed in workers handling a substance, the substance has been investigated. Hence some substances are known to be hazardous, some may reasonably be presumed to be safe while the status of many others remains unknown.

The issue is how to protect workers' health. The aim is to identify substances that may pose a risk to human health without having to await human evidence. However, while humans continue to be exposed to substances of unknown toxicity, human experience should be considered valuable data for assessing risks and the potential for risk. There is increasing pressure from the public and labour for stricter government controls of hazardous substances. However, with limited resources, limited information and finite time, the problem is how, from this vast array of untested substances, can hazards be assessed, risks be estimated and priorities for control be assigned. Once hazardous substances are identified as posing a risk to workers, how can exposure to these substances be controlled and who should have the responsibility for these controls? What roles should government, employers and employees play?

Background

The Honourable Mr. Ramsay, Minister of Labour, requested that the advisory council aid the ministry in determining which substances should be the subject of designated substance regulations. After considerable debate, council agreed to help the ministry by developing criteria for determining which substances should be controlled. Council faced the difficulty that, while acknowledging the need for criteria, it was not convinced that designated substance regulations should be the only, or even the preferred, means of regulating hazardous substances in the workplace.

Council formed a Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace. The terms of reference of the task force are presented in Appendix I.

The working principles of the task force were:

1) substances that are likely to pose a risk to the health of workers should be controlled;
2) substances that pose the 'greatest risk' to the health of Ontario workers should be controlled first;
3) the determination of the 'greatest risk' should involve consideration of:
   a) the likelihood of an Ontario worker experiencing an adverse health effect (which is dependent upon the toxic properties of the substance and the extent of worker exposure), and
   b) the nature of the effect;

4) the nature of controls will depend upon the nature and use patterns of individual substances;
5) substances posing the 'greatest risks' to Ontario workers should be controlled by the most stringent means.

The work of the task force has been divided into two parts.

The objectives of Part I are:

1) to identify criteria for determining the order in which substances should be considered for control.
2) to identify means of obtaining the information needed to apply the criteria identified in Objective 1.

The objectives of Part II will be:

1) to propose options, including regulation, for the control of hazardous substances in the workplace.
2) to advocate means of ensuring adequate public input into the regulatory process.
3) to identify the information needed to determine the most appropriate control strategy.

Appendix II contains a brief review of: a) interdepartmental and intergovernmental initiatives for the integration and development of strategies for controlling hazardous substances; b) the determination and application of criteria for identifying and ranking hazardous substances; c) programs for providing information on hazardous substances; and, d) workplace control programs. The examples cited include some of the most recent initiatives that may have an effect on the Ontario Ministry of Labour's decisions or serve as models for reaching decisions on criteria, information needs, control strategies and programs in the workplace.

Definitions and Interpretations

For the purposes of this document, the definition of terms such as 'substance' and 'toxicity' have been expanded so that they include physical and biological agents with the potential to cause adverse health effects in the work environment. However, safety hazards such as explosives and flammables, where the risk is related to the physical characteristics of the substance and is dependent upon abnormal conditions of use of the substances, emergencies and spills are not included (see definition of safety hazard versus health hazard in Attachment 3 of Appendix II or Reference 9). The Workplace Hazardous Materials Information System (WHMIS) should provide detailed criteria for the identification of such safety hazards as well as health hazards.

Adverse Health Effect — is any effect that will impair any bodily function* or will decrease longevity of workers or their offspring.

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* In the context of this paper, impairment of bodily function applies to physiological or biochemical changes that may lead to mortality or morbidity. Variations on the definition of adverse effects are discussed in Reference 2.

Substance – is used broadly in this document to include chemicals, mixtures, biological and physical agents.

Toxicity – is an inherent property of a substance. In this paper a toxic substance will be used to mean a substance that may cause an adverse health effect if a person is exposed to the substance in a particular way.

Exposure – describes the contact between the worker and the substance. Before a toxic substance can pose a risk to the health of a worker, the worker has to be exposed to the substance. The likelihood and the nature of the adverse health effect will depend upon the nature and extent of exposure of a worker to a toxic substance.

- *Nature of exposure* describes the route of exposure e.g. skin contact, inhalation or ingestion;
- *Extent of exposure* is a composite of the magnitude, the frequency and duration of exposure. The magnitude is a measure or estimate of the amount of the substance the worker contacts and expressed as a concentration in a solid or liquid being handled, ppm or mg/m^3 of air being inhaled and mg intake/kg of body weight.*

Hazardous substance – is used in this paper to describe a substance that is toxic.

Risk – a risk exists when an individual is exposed to a toxic substance in a way that could cause an adverse health effect to the individual or his/her offspring. Risk is expressed as the probability of the adverse health effect occurring.

Risk Assessment – is a process that consists of a number of different phases. The phases are divided and defined differently by many groups. For the purposes of this document three phases will be used:

1) *Hazard Identification* involves determining whether or not a substance is likely to present a risk if individuals are exposed. The evidence that a substance is hazardous can come from i) human experience, including epidemiological studies, ii) animal experiments, iii) other toxicological testing, supplemented by an analysis of the chemical structure.

2) *Risk Estimation* involves quantifying the risk associated with exposure to a particular substance or situation, i.e. the probability that an adverse health effect will occur as a result of a specified exposure.

   Risk can be measured using the results of epidemiological studies and expressed as:

   a) *Absolute risk* – in a range 0-1, where 0 means no exposed person is expected to exhibit the health effect and 1 means every exposed person is expected to exhibit the effect.
   b) *Relative risk* – a comparison of the risk in an exposed population with the risk in an unexposed population.

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* It should be stressed that these measures do not represent measures of the amount of substance reaching the target organ or tissue.

c) *Attributable risk* – a difference in the incidence of a particular outcome in exposed and unexposed groups expressed as a percentage of that outcome that can be attributable to exposure to a particular substance.

Although the only way to measure risk directly is to use human data, the objective of all occupational health and safety activities is to prevent, as far as possible, adverse health effects from occurring. Hence it is necessary to develop and use methods of estimating the risk to humans that do not rely on human experience*. The factors that need to be considered when interpreting the results of toxicological tests will be discussed later in the document.

For the purposes of this paper, it is necessary to determine which substances pose the greatest risk to the health of Ontario workers. This 'risk' could be expressed as the number of workers in Ontario expected to experience an adverse health effect as a result of a specific exposure to a specific substance in the workplace, or, alternatively, the proportion of workers in Ontario that is estimated to experience the effect.

3) *Risk Evaluation* involves evaluating the impact (i.e. considering the nature and severity) of the adverse health effect.

Risk Management is the strategy for dealing with risk. It involves consideration of: the risks of using a substance in a particular way; the benefits to both individuals and society that accrue from its use; whether there is equity in the distribution of risks and benefits; whether there are any control strategies in use and how effective they are; and the costs, benefits and effectiveness of various alternative control/regulatory strategies.

Control strategy is any method used to limit workers' exposure to hazardous substances.

Regulation is used to specify control strategies as legal requirements.

IDENTIFICATION OF CRITERIA

The objective of this part of the paper is to identify criteria and procedures for determining the order in which substances should be considered for regulation or control in the workplace.

Since the objective of control is to protect human health, the magnitude of risk presented by substances and the significance of the health effects they may produce should determine the priorities for control.

The task of setting priorities involves all phases of the risk assessment process, and for the sake of this document, the criteria and factors to be considered will be divided into two stages, i.e.:

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* When the risk is estimated by extrapolating data from animal experiments, the uncertainties should be acknowledged and taken into consideration when using the estimates.

Stage	Factors to be Considered	Application
1 - Hazard Identification	Criteria for determining which substances are toxic and may present a risk in Ontario workplaces	preliminary evaluation of the literature and use in Ontario
2 - A) Risk Estimation and - B) Risk Evaluation	Factors to be considered for estimating and evaluating risk to Ontario workers from hazardous substances	preliminary estimation of the magnitude and nature* of the risk

Stage 1 – Hazard Identification

As described in the Introduction, the data for hazard identification come from human experience, including epidemiological studies, animal experiments and/or other toxicological tests.

The main factors to be considered when interpreting animal or *in vitro* data are:

- how good are the data;
- how do the properties relate to adverse health effects in humans; and,
- what is the predictive value of the test, e.g.
  - what proportion of substances that are mutagenic *in vitro* cause cancer in humans?
  - What proportion of substances that cause cancer in humans are mutagenic *in vitro*?

Criteria for determining which substances are toxic and may present a risk in Ontario workplaces

Substances considered in this initial screening are:

1) used in workplaces in Ontario. (The use and distribution pattern are major considerations); *and*
2) considered or suspected to be toxic to humans as a result of:
   a) human studies, or
   b) animal experiments, or
   c) other toxicological testing, or
   d) similarity in chemical structure or nature to known toxic substances; or
3) regulated/controlled in other jurisdictions; or
4) listed as hazardous substances by other specified agencies or groups**.

Stage 2 – Risk Estimation and Risk Evaluation

In this stage preliminary risk estimation and evaluation are used to set priorities for further investigating substances that may present a significant risk to the health of workers in Ontario.

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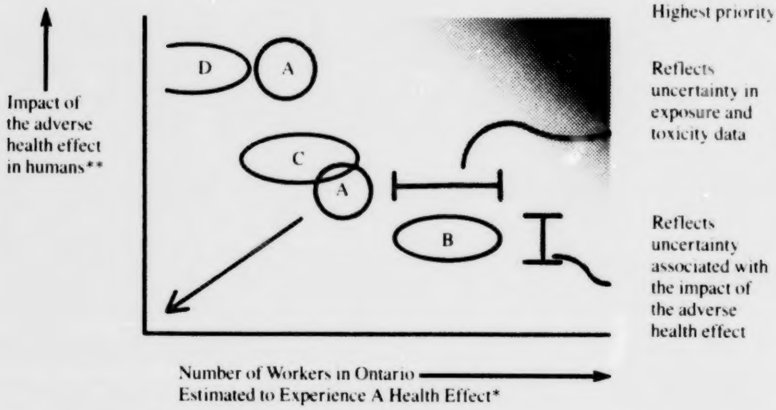
* The risk evaluation used in this stage considers the impact, in human terms (i.e. the nature and severity), of the adverse health effect.

** Many other jurisdictions identify 'Source Lists' of hazardous substances (See Refs. 4, 5, 6, and Attachments 1-4 of Appendix II.)

It is proposed that a systematic process be used to select substances of high priority (high risk of a serious impact) and that these substances should then be investigated in detail in the next stage (see Part II).

The proposed approach involves presenting data from the preliminary estimation and evaluation of risk on a priority graph (see Figure 2). The horizontal axis represents the number of workers who, on the basis of their exposure to a particular substance, are expected to experience a particular health effect*. The vertical axis represents the 'impact' of the expected health effect and is a function of degree and reversibility of impairment**.

Figure 2 - Priority Graph


Highest priority
Reflects uncertainty in exposure and toxicity data
Impact of the adverse health effect in humans**
D
A
C
A
B
Reflects uncertainty associated with the impact of the adverse health effect
Number of Workers in Ontario Estimated to Experience A Health Effect*

Each substance will be represented on the graph as one or more areas. The size of the area(s) will represent the degree of uncertainty.

Substances represented by areas near the top right-hand corner, i.e. substances expected to cause a serious impact on a large number of workers in Ontario, should be the highest priority, and substances represented by areas near the origin, i.e. substances expected to cause a minor impact on few workers in Ontario, should be low priority. However, the determination of priorities among substances represented by areas in the top left and bottom right regions of the graph will be difficult and requires value judgements, e.g. whether a substance (D) estimated to cause death to one Ontario worker is more important to control than a substance (C) estimated to cause a hearing loss in 1,000, or a substance (B) expected to cause a rash on 100,000 workers.

Council recognizes that, with limited data on toxicity and exposure, the determination of risk is complex and fraught with uncertainty†. However, for the purposes of determining priorities the estimations do not need to be precise. Council suggests a simple scheme to estimate the risks, but recognizes that judgement is needed during the process. The estimations are used only to order the substances according to the extent and impact of the risk they may present. Application of this scheme can commence even when the data available are inadequate. The graphs can be refined as better and/or more extensive data become available.

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* The derivation of this value will be explained in A) Risk Estimation (pages 24-27).

** The derivation of this value will be explained in B) Risk Evaluation (pages 28-30).

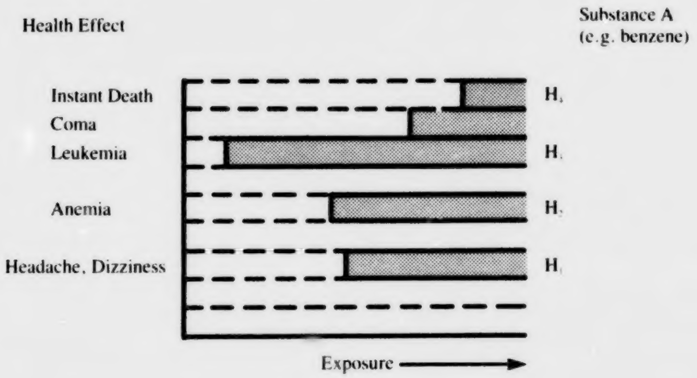
† With the paucity of information on toxicity and exposure it is understandable how the 'sore thumb' approach to regulation evolved, i.e. the control of substances that have been demonstrated to cause adverse health effects and have elicited widespread publicity.

A)*Risk Estimation*

The process of estimating risk is described to illustrate the approach, the factors to be considered and a means of accounting for uncertainty.

Many substances cause a variety of health effects depending on the route and extent of exposure. This is illustrated schematically in Figure 3. Other substances may cause only one health effect.

Figure 3 - Outcome of Exposure



The proportion of exposed individuals experiencing a health effect (the risk) will also vary according to the extent and nature of the exposure and the particular substance. These data are displayed on dose-response curves where the 'response' represents the proportion of exposed individuals expected to experience the health effect, and 'dose' represents the level of exposure (Figure 4).

Figure 4 - Dose-Response Curves

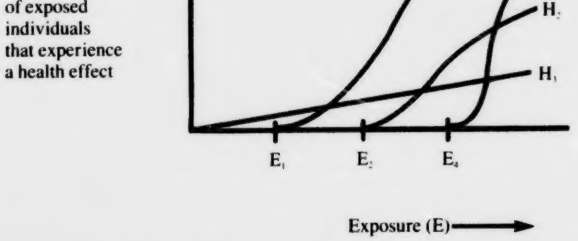


Figure 4 could represent the various dose-response curves for Substance A (described in Figure 3). The various effects will have different threshold dose levels* (TDLs) (E_1, E_2, and E_3). Above these exposure levels an increasing proportion of exposed individuals experience the respective health effects. Some health effects may have no demonstrable TDL, and the proportion of individuals experiencing the health effect may increase linearly with increasing exposure (illustrated by H_5 in Figure 4).

The proportion of exposed workers expected to experience an effect (i.e. the risk) at a specific exposure can be determined from the dose-response curve. This estimate will have a degree of uncertainty depending upon the quality of the data. There are usually insufficient epidemiological data to make such an estimate of risk.

The results of animal experiments can also be expressed as dose-response curves and be used to estimate the proportion of a specific strain of an animal species that will experience a health effect when exposed to a Level E of a substance. In many instances it is possible to predict from animal studies the adverse health effects in humans. However, it is important to realize that experimental animal models have their limitations and that the accuracy and reliability of a prediction of adverse health effects in humans depend on a number of conditions. These include choice of animal species, design of the experiments and the methods of extrapolating the data. The extrapolation needs to take into account differences in: species; routes of exposure; metabolic pathways; dose levels (i.e. how can effects occurring in a homogeneous population of a different species exposed to high concentrations of a substance in controlled conditions be used to estimate the effects in humans exposed to low variable concentrations likely to be encountered in workplaces?). There is a body of literature on pharmaco-kinetics and toxico-kinetics that attempts to identify the factors and methods of accounting for these differences. A World Health Organization document[2] summarizes some of these factors and the difficulties and uncertainties associated with a prediction of adverse health effects in humans.

In vitro test results are even more difficult to interpret and can only be used to anticipate its nature whether or not there may be an adverse health effect in humans. Substances identified as hazardous by *in vitro* testing should be considered separately (see Determination of Priorities, page 29).

For the other substances identified as hazardous in Stage 1, the data, regardless of whether they are from human or animal studies, should be extrapolated to estimate a dose-response curve. For animal data the extrapolations involve two steps:

1) Predicting the adverse health effect(s) expected to occur in humans.
2) Estimating dose-response curves for the effects in humans.

The uncertainties associated with the extrapolations and the quality of data should be expressed as confidence limits (represented by the dotted lines) see Figure 5.

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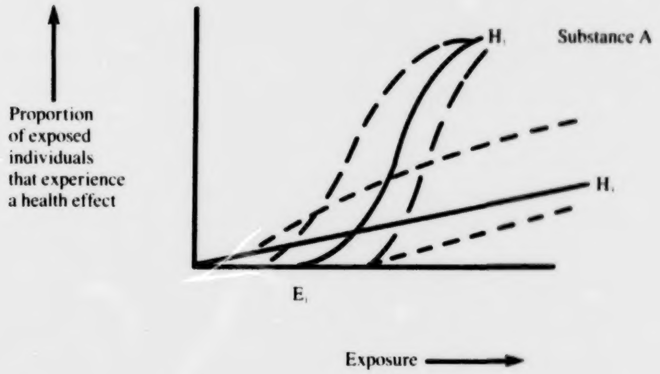
* A threshold dose level is a level below which no adverse health effect is expected to result from exposure. However, in the case of sensitized or hyper-susceptible individuals there may be adverse health effects below this level, and it may be necessary to consider such individuals separately (see later).

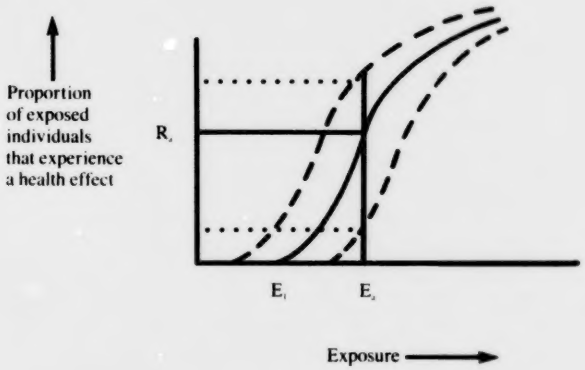
Figure 5 – Dose-Response Curves with Confidence Limits



The health effects and the dose-response curves can be determined by using data from the literature. However, to estimate the risk to Ontario workers by using the dose-response curves, it is necessary to know the number of workers exposed and the levels of their exposures. Council recognizes that the exposures will vary with occupations, workplaces and processes, and that initially accurate estimates of exposure will not be possible.

Figure 6 illustrates how to estimate the risk R_a (and degree of confidence) of Health Effect H_1 occurring to workers in Ontario workplaces where the worker-weighted-average exposure is E_a.

Figure 6 – Calculation of Risk from Dose-Response Curve



To obtain an estimate of the number of workers in Ontario expected to experience a health effect as a result of being exposed to substance A, the risk R_a (the proportion of exposed individuals experiencing the effect) should be multiplied by the number of workers exposed to substance A in Ontario. This value should be used as the abscissa in Figure 2 (see p.23).

It should be re-emphasized that the extrapolations, the resulting dose-response curves and the estimates of exposure are only rough approximations to determine the order of magnitude of the risk. These preliminary investigations and resulting approximations of risk should not be used as a basis for setting exposure limits for the Risk Management Stage (see Part II). However, for substances in use in the workplace the order of magnitude of the risk can be checked. That is even when the human experience data are too imprecise to estimate risk they may be sufficient to determine that an estimate derived from animal data is unrealistic. An example would be if the estimate predicted that 50 per cent of exposed workers would experience an adverse health effect, and the particular health effect was not observed in the workers who have been exposed. For health effects with long latent periods, the process of checking is complicated by time delays between exposure and the manifestation of the effect, intervening events, and loss of, or inadequate, records.

If exposure levels vary significantly according to occupation, industry or process, separate estimates of risk should be made. This is particularly important if, over the exposure range in the workplace, more than one health effect is expected. Separate but supplementary estimates should also be made to accommodate the substances that may cause different effects or effects at different exposures in sensitized or hyper-susceptible individuals.

B) *Risk Evaluation*

There are many approaches to determining priorities among substances for further investigation, control, or regulation. Two approaches are described in Appendix III. Systems used by other jurisdictions tend to weight the properties of the substances according to potency and nature of the toxic effect rather than by weighting the adverse health effects in humans.

To determine an index for the impact of adverse health effects in humans, council reviewed literature on health status indices and sickness impact profiles. Such indices and associated weighting systems are generally designed to assess small changes in health status or specific disease states and hence need to be both sensitive and specific. However, for the purpose of determining the significance of the risk, the severity of outcome and reversibility of effect are the important considerations. Other factors such as duration of the effect, course of effect, and age at onset will not be known in most instances and, for the purposes of setting priorities, will not be required.

Hence council recommends that the weighting system should be simple, comprehensive and practical, as illustrated in Table 1.

Table 1

Example of Weighting System for Determining the Impact of Health Effects in Humans*

Severity of Outcome	
Death	10
Irreversible	
total impairment**	9
partial	7
Reversible	
total impairment	4
partial	2

The AMA guide estimates impairment as opposed to disability. Disability depends upon the individual affected, specific job requirements (both physical and mental) and whether or not a worker can adapt to another job. As discussed earlier, when assessing a potential risk these factors are impossible to anticipate.

Some authors[4] have based the determination of a health index upon the restrictions individuals experience in undertaking various activities, e.g. no limitations; limitations on major activities but no limitations on minor activities; unable to perform major activities and limitations on minor activities; and unable to perform minor activities. The duration of the impaired state was found to be the most significant factor in determining public concern about various adverse health effects.[5] The duration of the effect is accounted for in Table 1 by weighting permanent impairment higher than temporary impairment.

An advantage of this scheme is that it is not restricted to chemical substances but can be used to classify physical agents, e.g. noise causing permanent partial impairment (hearing loss), asbestos causing death and/or permanent impairment (cancer, asbestosis) as well as caustic effects of chemicals causing death or impairment (burns, etc.).

The index determined from a Table similar to Table 1 will represent an estimation of the human impact of the adverse health effect caused by a particular substance or operation. This score should be used as the ordinate on the priority graph shown in Figure 2.

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* This index is used to describe, in human terms, a specific adverse health effect, e.g.: exposure to a suspected carcinogen may lead to death or permanent impairment; or, exposure to an acute toxin may also lead to death, but any other effect is likely to be temporary.

** The categories are very broad, and the weighting depends on judgement, but should, as far as possible, reflect public concern about the nature of the health effect. It is suggested that, if discrimination within these broad categories is desired, the definitions and determination of the degree of 'impairment of whole man' should follow the American Medical Association's (AMA) Guides to the Evaluation of Permanent Impairment' and should be applied to workers and their offspring. It is recognized that the weighting scheme for offspring will be slightly different,i.e. death of a fetus may be ranked lower than permanent impairment of an offspring.

Determination of Priorities

It is proposed that two priority graphs should be plotted: one for substances identified in Stage 1 by *in vitro* toxicological tests, the other for substances identified by human or animal data. The substances identified as hazardous by *in vitro* testing should undergo a preliminary investigation to anticipate the number of workers exposed in Ontario and the nature of the adverse health effect that could result from exposure. As mentioned earlier, data from *in vitro* tests cannot be used to estimate dose-response curves, hence the horizontal axis of the modified priority graph can only be used to represent the number of workers exposed to the substance. In these cases the substances identified as high priority should be assessed according to a system such as the proposed OECD 'criteria for selecting existing chemicals that most urgently need further information development for health purposes.'*. This process should also involve assessing the data according to the OECD data interpretation guides. Hence the high priority substances should be considered for further testing *and* progression to the next stage (i.e. the detailed investigation described in Part II). The issue of testing was addressed by council in Advisory Memorandum 83-IV. Although the advice contained in ACOHOS Recommendation 83-7 refers to the identification of potential carcinogens prior to the introduction of substances into the workplace, the same basic principles will apply to testing substances already in use in the workplace.

For the other substances identified as hazardous in Stage 1, the risk to Ontario workers should be estimated according to the scheme outlined on pages 23-25, and the human impact of specific adverse health effects should be determined by the degree and reversibility of impairment caused by the health effect as suggested in Table 1.

These estimates should be plotted on the priority graph (see Figure 2). Each substance will be represented on the graph as one or more areas. The size of the areas will represent the degree of uncertainty associated with the estimates.

Substances represented by areas near the top right-hand corner should be considered high priority for further consideration. Substances represented by more than one area on the graph may be considered higher priority than determined by any one component area. The example, Substance A, is used in Figure 7 to illustrate this concept.

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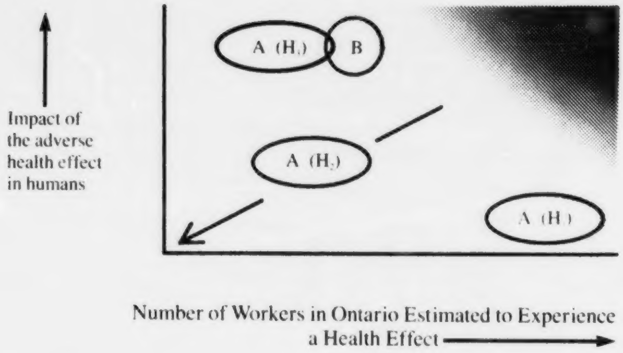
* The priority setting process proposed by the OECD will include a mechanism for ensuring that those substances for which there are insufficient data for complete processing will be identified and treated appropriately.

Figure 7 - Priority Graph


A (H)
B
Impact of the adverse health effect in humans
A (H)
A (H)
Number of Workers in Ontario Estimated to Experience a Health Effect

Assuming even a moderate degree of uncertainty, a number of areas on the graph will overlap making the decision on priorities difficult. In these instances other factors should be considered e.g. whether or not the substance has any other areas on the graph; whether or not there is potential for workers to become sensitized; and the degree of uncertainty.

The priority-graph approach has value for numerous reasons:

- it is flexible, i.e. additions and changes can be made when new substances are introduced; more information is available; or processes are altered, and priorities can be arranged accordingly;
- colour coding could be used to accomodate data divided according to:
  a) industry or occupation;
  b) substance use, e.g. solvents.

This could then be used to determine 'high priority occupations' or 'high priority groups of substances' to be investigated;

- clusters of substances may become obvious; these could cluster according to health effects and suggest generic regulation or control.

The interpretation and further uses of the priority graph should be the first consideration of the risk management stage and will be discussed in Part II.

ACOHOS RECOMMENDATION 85-1

that the Minister of Labour direct ministry staff to use the scheme outlined on pages 23-28 above to:

a) estimate the number of Ontario workers expected to experience an adverse health effect as a result of exposure to a specific substance in Ontario workplaces;
b) estimate the impact of the adverse health effect(s) according to categories such as those suggested in Table 1;
c) plot for each substance the estimates (a) and (b) on a priority graph (see Figure 2) so that the size of the area represents the uncertainty associated with each estimate; and

d) use the priority graph as the basis for determining the order in which substances should be investigated in detail to determine the most appropriate strategies for control.

ACOHOS RECOMMENDATION 85-2

> that the Minister of Labour publish annually the list of substances to be investigated in detail, setting forth the reasons for the inclusion of each substance on the priority list and inviting public comment.

Council recognizes that, given the present paucity of information, it will often be difficult to apply, systematically, the scheme outlined in this advisory memorandum. However, the scheme provides a conceptual framework for consideration of priorities and helps to identify additional information that is needed and the approach that should be taken.

INFORMATION NEEDED TO APPLY CRITERIA

It is re-emphasized that the priority setting process outlined above will produce a very rough estimate of the risk based on data that are readily available to the ministry (the toxicological data are recorded in the literature) or that should be available (data on number of workers exposed and approximate exposure levels are systematically recorded in many large companies). Council recognizes that, with the present situation, even the data that are collected in large companies are not always easily accessible to the ministry. Assuming that the Workplace Hazardous Materials Information System (WHMIS) will be adopted across Canada (see Appendix II), all workplaces will be required to maintain a list of hazardous substances that are present in the workplace. This information will have to be available to the workers. It is recommended that the ministry develop a register of the substances categorized as hazardous according to the WHMIS criteria, and that it is accompanied by a list of the workplaces that use the substances. The advantages of requiring employers to maintain records of all such substances in the workplace and the nature and degree of worker contact are numerous, e.g. it would aid the employers (and the ministry) in identifying hazards, evaluating risks, deciding which substances to control, and to regulate or observe; it would also help the ministry to monitor employers' ability to manage/control risks; the information would aid the employers to design workplace programs to address the needs of the individual worksite and employee; it would help the employees to understand the hazards to which they are exposed, the extent and nature of their exposures and the effects to their health that could result; and, finally, this information would allow employees and workers the opportunity to share the responsibility of their health and safety by taking the appropriate precautions, exercising good workplace hygiene practices and monitoring the controls/practices in the workplace.

Advisory Memorandum 80-IV recommended (ACOHOS Recommendation 80-34): 'that the Minister of Labour ensure that employment and exposure records are maintained for workers employed in workplaces where a known carcinogen or toxic agent that produces serious health effects is in use.'

The minister responded that: 'While the Minister of Labour expects to receive further advice on this matter from council when it completes work on the carcinogens project, the sweeping nature of this recommendation is being given careful consideration in the context of the development of a general health regulation.'

In Advisory Memorandum 83-IV a number of recommendations were made (in ACOHOS Recommendation 83-7) regarding the need to maintain: records of individual work histories, individual exposure records for workers exposed to Categories 1 and 2 substances, an up-to-date inventory of the agents in Categories 1 or 2 in use at each workplace, and material safety data sheets for each agent.

Without limiting the specificity or generality of the aforementioned recommendations, council recommends:

ACOHOS RECOMMENDATION 85-3

that the Minister of Labour require each employer to maintain:
a) a list of hazardous 'substances' used at each worksite and that this list is kept up to date;
b) work histories for employees containing at least the nature of the job(s) and a list of the hazardous substances with which the worker has been in contact and with which he or she is likely to contact.

ACOHOS RECOMMENDATION 85-4

that the Minister of Labour encourage and facilitate a process whereby employers develop and maintain exposure histories for all workers exposed to substances that may present a risk in the workplace. Consideration should be given to seeking the assistance of workers and/or the joint health and safety committee to carry out this activity.

ACOHOS RECOMMENDATION 85-5

that the Minister of Labour ensure the development and maintenance of a registry of all substances categorized as hazardous and a list of the workplaces using each of the hazardous substances.

Council recognizes that it may be difficult to reach a consensus of what constitutes a 'hazardous substance'. As a practical solution council suggests the adoption of a list such as that being developed for WHMIS. Two further points are stressed. First, any such list will need regular updating, and second, substances not appearing on the list cannot necessarily be assumed to be 'safe'.

References

1 National Research Council (U.S.) Steering Committee on Identification of Toxic and Potentially Chemicals for Consideration by the National Toxicology Program. 1984. Toxicity Testing: Strategies to determine needs and priorities. Washington: National Academy Press.
2 Environmental Health Criteria 6: *Principles and Methods of Evaluating the Toxicity of Chemicals. Part I.* World Health Organization – Geneva 1978.

3 *Guides to the Evaluation of Permanent Impairment*. American Medical Association: Committee on Rating of Mental and Physical Impairment, 1977.

4 Wilkins, Russell and Adams, Owen, *Healthfulness of Life* Institute for Research in Public Policy, 1983.

5 Sackett, D. L. and Torrance, G. W. 'The Utility of Different Health States as Perceived by the General Public'. *J. Chronic Diseases* 1978: 31: 697-704.

APPENDIX I

Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace

Terms of Reference:

1. To identify criteria for use in: establishing priorities for the control of hazardous substances and agents in the workplace, selecting appropriate control strategies and establishing priorities for the development of information on which to assess need for, and evaluation of, control measures.
2. To consider means for the systematic development of information required to apply criteria as described in 1 above.
3. To review current measures for the control of hazardous substances and agents in the workplace and to consider alternative approaches, including possible modifications of the current model of designated substance regulation.
4. To consider appropriate mechanisms for involvement of affected parties in the types of decisions and processes outlined in Terms of References 1, 2 and 3 above.
5. To report and make recommendations to council with respect to these matters.

APPENDIX II

Appendix II contains a brief review of a) interdepartmental and intergovernmental initiatives for integrating and developing strategies for control of hazardous substances; b) determination and application of criteria for identifying and ranking hazardous substances; c) programs for providing information on hazardous substances; and, d) workplace control programs. A comprehensive review would be beyond the scope of this document. The examples cited include some of the most recent initiatives that may have an effect on the Ontario Ministry of Labour's decisions or serve as models for reaching decisions on criteria, information needs, control strategies and programs in the workplace.

Interdepartmental or Intergovernmental Initiatives for Integrating and Developing Strategies for Control of Hazardous Substances

In recent years formal decision-making procedures for risk management have been studied by many groups [1,2]. However, the development of straightforward decision-making criteria that will satisfy government, industry and labour has not been forthcoming.

Federal Interdepartmental Committee on Toxic Chemicals

This committee is designing a framework for 'structuring the problem and organizing and obtaining the necessary information for arriving at optimal decisions.' The interdepartmental committee believes that government-wide adoption of the proposed management framework would significantly improve the consistency of approach to the management of risks posed by toxic chemicals and also make the regulatory processes more predictable.

The interdepartmental committee and the Canadian Council of Resource and Environment Minister (CCREM) consider the control of toxic substances from the broader perspective of the environment. However, the basic framework for risk assessment and the process of decision making will be very similar even though the specific criteria will be different. It is recognized that the identification and assessment of potentially harmful chemicals require appropriate scientific data. At present the scientific data are not available, and the task of providing the information is considered enormous.

The working group of the interdepartmental committee is in the process of proposing a framework for the risk management process. They acknowledge that there may be considerable uncertainty associated with the factors and that an analysis of the uncertainties may be required to make them explicit, thereby subjecting them to discussion and debate.

Organization for Economic Co-Operation and Development (OECD)

A priority-setting mechanism is being considered by the OECD. This mechanism and the associated criteria will serve as guidelines for the governments of member countries for selecting chemicals for further study from all those chemicals on which effects data are currently inadequate or non-existent.

Environment Canada

According to the Toxic Chemicals Management Program of Environment Canada, 'Given the complexity, difficulty and cost of establishing the exact nature of the toxic chemical threat with any degree of certainty and given, too, the economic impact and social consequences of actions in this area, the traditional government interventions of regulation and prohibition are inadequate *on their own* (emphasis added) to manage the toxic chemicals issue.' They propose an advocacy strategy to inform and promote shared responsibility in production, use and distribution of toxic chemicals.

However, it should be remembered that the Federal Department of the Environment has only shared authority under the *BNA Act* to legislate in the management of toxic chemicals and, hence, has to depend on federal-provincial co-operation.

Identification and Application of Criteria for Determining Hazardous Substances for Control

Ministry of the Ontario Environment

The Ontario Ministry of the Environment has established a Priority List Working Group to support the risk identification process of standard setting. It proposes to use the U.S. National Research Councils approach to establish tiers of chemicals for consideration.[3] The working group has identified a number of sources and lists to establish the bottom tier (Appendix 1). Data on health effects, exposure and regulatory status are used to determine the priority list. The group has developed criteria with numerical ratings, both for degree of concern (i.e. very toxic – high score, wide exposure – high score) and degree of confidence (i.e. good scientific data to support concern – high score). The system is primarily based upon a system developed in Michigan and is adapted to Ontario. However, the final ordering does not consist of a single number but pairs of numbers representing scores for concern and confidence. It is anticipated that this system will sort the substances into a continuum of groups from high confidence and greatest concern to high confidence and little concern.

It is planned that this ordering will determine the substances to be investigated. 'Criteria documents' will be produced containing the scientific information on risk estimation for substances of greatest concern. It is proposed that this information will be used as the basis of the risk assessment that initially was to be performed by an external Environmental Standards Advisory Committee (ESAC).* The advisory committee was to conduct a public review of the issue to obtain input from interested and affected parties. Prior to a recommendation to the minister for regulation/control strategy, it was proposed that the advisory committee would also consider social and economic considerations. This approach was cited as having the following advantages:[4]

- It interposes a distinct group of non-government people between the minister and all the interests and information he has to consider, increasing the minister's objectivity and *credibility*.

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* This proposal is still under review.

- It gives enough control over the process and the decision to a single body, providing *stability* to the risk assessment process.
- It has enough *flexibility* to respond to different circumstances or levels of hazard. It can call upon the range of expertise that is required in each case, and it is able to vary the range of detail of its attention accordingly.

Michigan: Critical Materials Register

Specific criteria for toxicity have been identified by the Michigan Department of Natural Resources. These were used initially as a screening for the selection of 'Critical Materials' (CM).[5] In 1978 the screening model was changed to a numerically scored hazard assessment system. Eight factors of concern were identified, and a series of points were assigned to each factor. The hazard assessments are performed by an advisory committee composed of representatives from academia, industry, government and special interest groups. The department stresses that the CM Register and factors were developed for a specific purpose (environmental concern in Michigan) and, hence, will not be applicable to all situations where lists of toxic or hazardous chemicals are needed. However, it does serve as a useful model for determining a rank ordering of substances according to toxicity (see Appendix III).

The limitations of the system are cited as:

- lack of information on toxicity
- lack of information on chemical composition of commercial products
- lack of inventory data on users.

In an attempt to overcome these limitations the Michigan Department of Natural Resources decided to include substances appearing on lists of chemicals prepared in previous reviews that have potential adverse effects on human health or substances that are produced in large quantities. For a detailed description of the source lists, see Appendix II. Following the compilation of the list of substances to be considered, there is a chemical evaluation, and the substances are assessed according to the criteria factors. Each criterion is defined, and the rationale for the assignment of numbers explained. There is no weighting of factors per se, but if the sum total of points from all the criteria exceeds a limit, then the substance is placed on the register in a rank order. There is a frequent review, especially for chemicals with insufficient data for certain criteria.

This means of preparing priority lists of substances according to a numerically scored hazard assessment system has been used as a model by other jurisdictions.

Programs for Providing Information on Hazardous Substances in the Workplace

United States: Occupational Safety and Health Administration

The United States Occupational Safety and Health Administration (OSHA) has promulgated a final occupational safety and health standard entitled 'Hazard Communication' (Federal Register, November 1983).[6] The standard requires manufacturers and importers to assess the hazards of chemicals they produce or import, and employers to provide information to their employees concerning hazardous chemicals by means of hazard communication programs. The hazard communication program includes provision of labels, material safety data sheets, training and access to written records.

The standard applies to both 'physical' and 'health' hazards. Each of these terms is defined by listing the various types of 'physical' and 'health' hazards covered. These listed hazards are then individually defined or, in the case of 'health' hazards, further explained in Appendix A.[6] Appendix B provides further guidance to the employer in terms of the criteria to be applied in determining whether or not a chemical is hazardous for the purposes of the standard. Appendix C lists a number of sources that are available for employers in the search for information on hazards. These Appendices are reproduced as attachment III (Appendix II).

Chemical manufacturers and importers are required to evaluate the chemicals they produce or import to determine if they are hazardous. They are to be guided by the definitions, Appendix A, B, and C, and must consider substances currently regulated by OSHA and those listed by ACGIH in its latest edition of the 'Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment'. Also, an employer must report any adverse health effect, for which there is scientific (i.e. statistically significant) evidence based on at least one positive study conducted in accordance with established scientific principles, that may occur as a result of employee exposure to a substance. The procedures used to evaluate hazards must be prepared in writing.

The hazard communication program is to be written and is to include how the employer plans to meet the criteria of the standard with respect to labels, material safety data sheets and training, a list of the hazardous chemicals in each work area, the methods the employer will use to inform employees of the hazards of non-routine tasks, contractors etc. The written program is to be made available to employees, their designated representatives, OSHA and NIOSH. OSHA acknowledges that the guidelines for the hazard communication program are considered to be minimal requirements and that compliance with them does not constitute an outstanding occupational hygiene program.

The standard also specifies the conditions for trade secret disclosure, contents of labels, MSDSs and training. It is stressed that it is a generic standard and is stated largely in performance language, but that this does not alter the essential (mandatory) character of the standard.

The aim of the standard is not merely at an identification of workplace chemicals but, more significantly, at the correction of the hazards as well. It is anticipated that this correction will occur largely as a result of employee compliance with instructions on how to protect themselves when exposed as well as other hazard-reducing strategies adopted by employers (e.g. substitution and implementation of engineering controls).

Canada: Workplace Hazardous Materials Information System (WHMIS)

A major interdepartmental federal/provincial initiative to establish a consistent comprehensive Workplace Hazardous Materials Information System is underway in Canada. The final report, which is expected in 1985, should provide a standard that will be the basis for federal and provincial legislation to require all hazardous materials to be labelled. Manufacturers and importers will be required to produce material safety data sheets and transmit them with their products to all workplaces. All employers will be required to train their employees and inform them of the hazards within the workplace, the precautions required for handling specific substances and what to do in an emergency.

Like the development of the OSHA hazard communication standard, the issue of protection of trade secrets *versus* the workers' right-to-know caused considerable discussion between labour and management representatives. The other major area of contention was the criteria for determining which substances are hazardous and hence should be labelled. It is interesting to note that the criteria are to be based on existing information, and it is anticipated that, to meet the requirements of WHMIS, there will be no need for any additional testing. However, substances for which there is no data should be identified, i.e. labelled, and 'no data' will be recorded in the appropriate section of the MSDSs. Effort has been made to respect criteria developed by Transport Canada for transportation of dangerous goods (TDG criteria). However, as the hazards for transportation are not necessarily the same as, or inclusive of, hazards to the health and safety of workers in the workplace, there have been various modifications involving reclassification and expansion of the criteria.

At this stage it is still unclear what adoption of this final report will mean in terms of regulatory requirements for the provinces and how this will be mandated in individual workplaces.

Control Strategies

United Kingdom

Although it is not planned to discuss hazard determination, regulatory strategies or workplace hygiene programs in the U.K., it is of interest to note that there is a move away from TLVs (from the ACGIH) towards guidelines or 'recommended limits'. The 'recommended limits' are considered to represent good practice and are used by factory inspectors as part of their criteria for assessing compliance. A health and safety executive explained that there are not enough toxicity data on most substances to warrant 'control limits'. Control limits have been set for less than a dozen substances.

Workplace Programs

Many large employers in Canada and other countries have developed their own workplace programs aimed at reducing hazards to workers.

The programs vary in their content and application depending on the specific conditions and requirements of individual worksites.

Such workplace programs consist of four phases:

1) Recognition or hazard assessment, which involve a knowledge of the toxicity of the substance and the mode and extent of (or potential for)

exposure. Many employers use criteria to identify the most important hazards for specific worksites. This assessment will often determine the priorities for the second phase:

2) Evaluation of the hazard. This phase involves the monitor ing of the hazard at specific worksites, determining worker exposures and training the employees.
3) The control phase will be dependent on the results of the hazard evaluation.
4) Evaluation of the controls and auditing the control processes.

References

1 *Risk Assessment in the Federal Government: Managing the Process*. Committee on the Institutional Means for Assessment of Risks to Public Health, National Research Council, National Academy of Sciences. Washington: National Academy Press, 1983.

2 Burton, I., Fowle, C.D. and McCullough, R. S. (eds.). *Living with Risk: Environmental Risk Management in Canada*. Environmental Monograph No. 3, Institute for Environmental Studies, University of Toronto, 1982.

3 National Research Council (U.S.) Steering Committee on Identification of Toxic and Potentially Chemicals for Consideration by the National Toxicology Program. 1984. Toxicity Testing: Strategies to determine needs and priorities. Washington: National Academy Press.

4 Piche, E.W., *Risk and Responsibility: Managing toxic substances in the environment*. Presented to the First Conference on Toxic Substance, Montreal, Quebec, April 1984.

5 *Critical Materials Register 1980*. Department of Natural Resources, State of Michigan Publication No. 4833-5324. (See Attachments to Appendix I)

6 *Hazard Communication: Final Rule*. Occupational Safety and Health Administration. *Federal Register*, 48 (228): 53280- 53348 November 25, 1983.

ATTACHMENT 1
(APPENDIX II)

CHEMICAL LIST TO BE CONSIDERED
BY
PRIORITY LIST WORKING GROUP

Priority and Candidate Chemicals - Environmental Contaminants Act 1

Water Management - Goals, Policies, Objectives and Implementation Procedures of the Ontario Ministry of the Environment 5

List of Standards, Tentative Standards, Guidelines and Provisional Guidelines for Air Contaminants - Ontario Ministry of the Environment 6

Critical Materials Register, and Air Priority Chemicals List, Michigan Department of Natural Resources 7

Priority Pollutant List - U.S. EPA 10

PHS - 149 Carcinogenic Activity 11

Chemicals Recommended to the U.S. EPA for Further Testing by the U.S. I.T.C. 12

Chemicals for Review by the U.S. I.T.C. 16

List of Substances which may be Candidates for further Scientific Review and Possible Identification Classification, and Regulation as Potential Occupational Carcinogens - O.S.H.A. 17

Hazardous Waste Definition - M.O.E. 19

Teratogenic Agents 21

Public Health Service Chemicals Nominated for Toxicological Testing 22

ATTACHMENT 1 (cont)
(APPENDIX II)

E.P.A. Selected Organic Air Pollutants: Pollutant Strategies Branch 23

Ontario Guidelines for Classification of Pesticides Products 24

Chemical Categories Submitted as TSCA "Risk List" Candidates by the U.S. EPA 26

California Standards Board Hazards List 27

Cancer Causing Chemicals 28

Substances Found in the Great Lakes Basin, Great Lakes Water Quality Board, I.J.C. 29

International Register of Potentially Toxic Chemicals - UNEP 30

Oil and Hazardous Material/ Technical Assistance Data 31

Chemical Evaluation Search and Retrieval System 32

Food and Drugs Act and Drug Regulations 33

Each is explained and specific references given in this 33 page Draft Document.

To this is added sources used as alerting devices.

FIGURE 5 (continued)

The different sources used as alerting devices are the following:

news media
specialized news media
agency releases

There is an overlap between each of them, but each has its own characteristic and major purpose listed below:

News Media: these indicate areas of immediate and popular concern. New initiatives and findings will occasionally make the news.

Specialized News Media: these are similar to the news media but are more specific to our areas of concern.

Agency Releases: usually indicate findings, activities and conclusions of their agency on different topics.

Examples of the major sources used are listed below:

News Media: Environment Ontario Clipping Service

Specialized News Media: Chemical Regulation Reporter
Chemical Week
Clean Air
Clean Water Report
Ecolog Week
Environment Reporter
Hazardous Materials Intelligence Report
Hazardous Waste News

Table 9. Chemical Lists Utilized for 1977 CMR Revision.

Potential Industrial Carcinogens and Mutagens. National Center for Toxicological Research. (90 chemicals)

Persistent Toxic Substances, International Joint Commission. (57 chemicals or classes)

List of Hazardous Substances, U.S. Environmental Protection Agency. (306 chemicals)

General Agreement - Restricted Pesticide List, December, 1976, U.S. Environmental Protection Agency. (81 chemicals)

List of Priority Pollutants, U.S. Environmental Protection Agency. (129 chemicals)

Toxic Pollutant List, Prepared by Tracor, Jitco, Inc. for the U.S. Environmental Protection Agency. (226 chemicals)

List of Substances of Concern, State of New York, Department of Environmental Conservation. (135 chemicals or classes)

OSHA Standards for Carcinogens, Occupation Safety and Health Administration. (14 chemicals)

Table 10. Chemical Lists Utilized for 1978 CMR Revision

TSCA Preliminary List, U.S. Environmental Protection Agency. (300 compounds or classes of compounds)

Preliminary Possible Pollution List, U.S. Environmental Protection Agency, Region V. (38 specific chemicals)

Table 11. Chemical Lists Utilized for 1979 CMR Revision

List of Chemical Contaminants in the Great Lakes; Table I & II. International Joint Commission, Great Lakes Water Quality Board Status Report, Appendix E. (50 chemicals)

Scoring of Organic Air Pollutants. Prepared by MITRE Corporation for the U.S. Environmental Protection Agency. EPA-450/3-77-00814. (637 chemicals)

Preliminary List of Chemicals Submitted for Air Pollution Exposure Studies. U.S. Environmental Protection Agency. (40 chemicals)

List of Chemicals with Time Weighted Average Exposure Limits for Occupational Exposure in the Workplace. Occupational Safety and Health Administration. (360 chemicals and classes)

ATTACHMENT 3

(APPENDIX II)

secret status can be made and the necessary protections can be implemented.

(13) Nothing in this paragraph shall be construed as requiring the disclosure under any circumstances of process or percentage of mixture information which is trade secret.

(j) *Effective dates.* Employers shall be in compliance with this section within the following time periods:

(1) Chemical manufacturers and importers shall label containers of hazardous chemicals leaving their workplaces, and provide material safety data sheets with initial shipments by November 25, 1985.

(2) Distributors shall be in compliance with all provisions of this section applicable to them by November 25, 1985.

(3) Employers shall be in compliance with all provisions of this section by May 25, 1986, including initial training for all current employees.

Appendix A to § 1910.1200—Health Hazard Definitions (Mandatory)

Although safety hazards related to the physical characteristics of a chemical can be objectively defined in terms of testing requirements (e.g. flammability), health hazard definitions are less precise and more subjective. Health hazards may cause measurable changes in the body—such as decreased pulmonary function. These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees—such as shortness of breath, a non-measurable, subjective feeling. Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change.

The determination of occupational health hazards is complicated by the fact that many of the effects or signs and symptoms occur commonly in non-occupationally exposed populations, so that effects of exposure are difficult to separate from normally occurring illnesses. Occasionally, a substance causes an effect that is rarely seen in the population at large, such as angiosarcomas caused by vinyl chloride exposure, thus making it easier to ascertain that the occupational exposure was the primary causative factor. More often, however, the effects are common, such as lung cancer. The situation is further complicated by the fact that most chemicals have not been adequately tested to determine their health hazard potential, and data do not exist to substantiate these effects.

There have been many attempts to categorize effects and to define them in various ways. Generally, the terms "acute" and "chronic" are used to delineate between effects on the basis of severity or duration. "Acute" effects usually occur rapidly as a result of short-term exposures, and are of short duration. "Chronic" effects generally occur as a result of long-term exposure, and are of long duration.

The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) standard for Precautionary Labeling of Hazardous Industrial Chemicals (Z129.1-1982)—irritation, corrosivity, sensitization and lethal dose. Although these are important health effects, they do not adequately cover the considerable range of acute effects which may occur as a result of occupational exposure, such as, for example, narcosis.

Similarly, the term chronic effect is often used to cover only carcinogenicity, teratogenicity, and mutagenicity. These effects are obvious a concern in the workplace, but again, do not adequately cover the area of chronic effects, excluding, for example, blood dyscrasias (such as anemia), chronic bronchitis and liver atrophy.

The goal of defining precisely, in measurable terms, every possible health effect that may occur in the workplace as a result of chemical exposures cannot realistically be accomplished. This does not negate the need for employees to be informed of such effects and protected from them.

Appendix B, which is also mandatory, outlines the principles and procedures of hazard assessment.

For purposes of this section, any chemicals which meet any of the following definitions, as determined by the criteria set forth in Appendix B are health hazards:

1. *Carcinogen:* A chemical is considered to be a carcinogen if:

(a) It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or

(b) It is listed as a carcinogen or potential carcinogen in the *Annual Report on Carcinogens* published by the National Toxicology Program (NTP) (latest edition); or,

(c) It is regulated by OSHA as a carcinogen.

2. *Corrosive:* A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. For example, a chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described by the U.S. Department of Transportation in Appendix A to 49 CFR Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term shall not refer to action on inanimate surfaces.

3. *Highly toxic:* A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

(c) A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

4. *Irritant:* A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for four hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

5. *Sensitizer:* A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

6. *Toxic.* A chemical falling within any of the following categories:

(a) A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

(b) A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

(c) A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

7. *Target organ effects.* The following is a target organ categorization of effects which may occur, including examples of signs and symptoms and chemicals which have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but are not intended to be all-inclusive.

a. Hepatotoxins	Chemicals which produce liver damage.
Signs and Symptoms	Jaundice; liver enlargement.
Chemicals	Carbon tetrachloride, nitrosamines.
b. Nephrotoxins	Chemicals which produce kidney damage.
Signs and Symptoms	Edema; proteinuria.
Chemicals	Halogenated hydrocarbons; uranium.
c. Neurotoxins	Chemicals which produce their primary toxic effects on the nervous system.
Signs and Symptoms	Narcosis; behavioral changes; decrease in motor functions.
Chemicals	Mercury; carbon disulfide.
d. Agents which act on the blood or hematopoietic system.	Decrease hemoglobin function; deprive the body tissues of oxygen.
Signs and Symptoms	Cyanosis; loss of consciousness.
Chemicals	Carbon monoxide; cyanides.
e. Agents which damage the lung	Chemicals which irritate or damage the pulmonary tissue.
Signs and Symptoms	Cough; tightness in chest; shortness of breath.
Chemicals	Silica; asbestos.
f. Reproductive toxins	Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).
Signs and Symptoms	Birth defects; sterility.
Chemicals	Lead; DBCP.
g. Cutaneous hazards	Chemical which affect the dermal layer of the body.
Signs and Symptoms	Defatting of the skin; rashes; irritation.
Chemicals	Ketones; chlorinated compounds.
h. Eye hazards	Chemicals which affect the eye or visual capacity.
Signs and Symptoms	Conjunctivitis; corneal damage.
Chemicals	Organic solvents; acids.

Appendix B to § 1900.1200—Hazard Determination (Mandatory)

The quality of a hazard communication program is largely dependent upon the adequacy and accuracy of the hazard determination. The hazard determination requirement of this standard is performance-oriented. Chemical manufacturers, importers, and employers evaluating chemicals are not required to follow any specific methods for determining hazards, but they must be able to demonstrate that they have adequately ascertained the hazards of the chemicals produced or imported in accordance with the criteria set forth in this Appendix.

Hazard evaluation is a process which relies heavily on the professional judgment of the evaluator, particularly in the area of chronic hazards. The performance-orientation of the hazard determination does diminish the duty of the chemical manufacturer, importer or employer to conduct a thorough evaluation, examining all relevant data and producing a scientifically defensible evaluation. For purposes of this standard, the following criteria shall be used in making hazard determinations that meet the requirements of this standard.

1. *Carcinogenicity:* As described in paragraph (d)(4) and Appendix A of this section, a determination by the National Toxicology Program, the International Agency for Research on Cancer, or OSHA that a chemical is a carcinogen or potential carcinogen will be considered conclusive evidence for purposes of this section.

2. *Human data:* Where available, epidemiological studies and case reports of adverse health effects shall be considered in the evaluation.

3. *Animal data:* Human evidence of health effects in exposed populations is generally not available for the majority of chemicals produced or used in the workplace. Therefore, the available results of toxicological testing in animal populations shall be used to predict the health effects that may be experienced by exposed workers. In particular, the definitions of certain acute hazards refer to specific animal testing results (see Appendix A).

4. *Adequacy and reporting of data:* The results of any studies which are designed and conducted according to established scientific principles, and which report statistically significant conclusions regarding the health effects of a chemical, shall be a sufficient basis for a hazard determination and reported on any material safety data sheet. The chemical manufacturer, importer, or employer may also report the results of other scientifically valid studies which tend to refute the findings of hazard.

Appendix C to § 1900.1200—Information Sources (Advisory)

The following is a list of available data sources which the chemical manufacturer, importer, or employer may wish to consult to evaluate the hazards of chemicals they produce or import:

— Any information in their own company files such as toxicity testing results or illness experience of company employees.

— Any information obtained from the supplier of the chemical, such as material safety data sheets or product safety bulletins

— Any pertinent information obtained from the following source list (latest editions should be used):

Condensed Chemical Dictionary
Van Nostrand Reinhold Co., 135 West 50th Street, New York, NY 10020
The Merck Index: An Encyclopedia of Chemicals and Drugs
Merck and Company, Inc., 126 E. Lincoln Avenue, Rahway, NJ 07065
IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man
Geneva: World Health Organization, International Agency for Research on Cancer, 1972–1977. (Multivolume work). 49 Sheridan Street, Albany, New York
Industrial Hygiene and Toxicology, by F. A. Patty
John Wiley & Sons, Inc., New York, NY (Five volumes)
Clinical Toxicology of Commercial Products
Gleason, Gosselin and Hodge
Casarett and Doull's Toxicology: The Basic Science of Poisons
Doull, Klaassen, and Amdur, Macmillan Publishing Co., Inc., New York, NY
Industrial Toxicology, by Alice Hamilton and Harriet L. Hardy
Publishing Sciences Group, Inc., Acton, MA
Toxicology of the Eye, by W. Morton Grant
Charles C. Thomas, 301–327 East Lawrence Avenue, Springfield, IL
Recognition of Health Hazards in Industry
William A. Burgess, John Wiley and Sons, 605 Third Avenue, New York, NY 10158
Chemical Hazards of the Workplace
Nick H. Proctor and James P. Hughes, J. P. Lipincott Company, 6 Winchester Terrace, New York, NY 10022
Handbook of Chemistry and Physics
Chemical Rubber Company, 18901 Cranwood Parkway, Cleveland, OH 44128
Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes
American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Bldg. D-5, Cincinnati, OH 45211

Note.—The following documents are on sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

- *Occupational Health Guidelines*
  - NIOSH/OSHA (NIOSH Pub. No. 81-123)
- *NIOSH/OSHA Pocket Guide to Chemical Hazards*
  - NIOSH Pub. No. 78-210
- *Registry of Toxic Effects of Chemical Substances*
  - U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health (NIOSH Pub. No. 80-102)
- *The Industrial Environment—Its Evaluation and Control*
  - U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health (NIOSH Pub. No. 74-117)
- *Miscellaneous Documents*—National Institute for Occupational Safety and Health
  1. Criteria for a recommended standard * * * Occupational Exposure to "——"
  2. Special Hazard Reviews
  3. Occupational Hazard Assessment
  4. Current Intelligence Bulletins

Bibliographic Data BAses

Service Provider and *File Name*

- Bibliographic Retrieval Services (BRS), Corporation Park, Bldg. 702, Scotia, New York 12302
  - AGRICOLA
  - BIOSIS PREVIEWS
  - CA CONDENSATES*
  - CA SEARCH
  - DRUG INFORMATION
  - MEDLARS
  - MEDOC
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  - POLLUTION ABSTRACTS
  - SCIENCE CITATION INDEX
  - SSIE
- Lockheed—DIALOG, Lockheed Missiles & Space Company, Inc., P.O. Box 44481, San Francisco, CA 94144
  - AGRICOLA
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  - BIOSIS PREV. 1969-71
  - CA CONDENSATES 1970-71
  - CA SEARCH 1972-76
  - CA SEARCH 1977-PRESENT
  - CHEMNAME
  - CONFERENCE PAPERS INDEX
  - FOOD SCIENCE & TECH. ABSTR.
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  - INTL. PHARMACEUTICAL ABSTR.
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  - SCISEARCH 1978-PRESENT
  - SCISEARCH 1974-77
  - SSIE CURRENT RESEARCH
- SDC—ORBIT, SDC Search Service, Department No. 2230, Pasadena, CA 91051
  - AGRICOLA
  - BIOCODES
  - BIOSIS/BIO6973
  - CAS6771/CAS7276
  - CAS77
  - CHEMDEX
  - CONFERENCE
  - ENVIROLINE
  - LABORDOC
  - NTIS
  - POLLUTION
  - SSIE
- Chemical Information System (CIS), Chemical Information Systems Inc., 7215 Yorke Road, Baltimore, MD 21212
  - Structure & Nomeclature Search System
  - Acute Toxicity (RTECS)
  - Clinical Toxicology of Commercial Products
  - Oil and Hazardous Materials Technical Assistance Data System
- National Library of Medicine, Department of Health and Human Services, Public Health Service, National Institutes of Health, Bethesda, MD 20209
  - Toxicology Data Bank (TDB)
  - MEDLIN
  - TOXLINE
  - CANCERLIT
  - RTECS

[FR Doc. 83-31827 Filed 11-23-83; 8:45 am]

BILLING CODE 4510-26-M

ATTACHMENT 4
(APPENDIX II)

DATA SOURCES

1. Classification of Materials According to Transportation Criteria.

Many substances and mixtures have been evaluated and classified according to the classification systems and criteria of the United Nations and Transport Canada. Where these criteria are equivalent to WHMIS, the information may be directly transposed. Examples of such systems include:

(a) Transport of Dangerous Goods - Recommendation of the UN Committee of Experts on Transportation of Dangerous Goods, International Regulations Publishing and Distributing Organization, Chicago, Illinois.

(b) Transportation of Dangerous Goods Regulations - Transport Canada (currently in proposed form)

(c) International Maritime Dangerous Goods (IMDG) Code.

2. Classification of Explosive Material

The Explosives Act and Regulations (1980) which are available from Energy Mines and Resources Canada describe the classification of Explosives.

3. Information Sources

Matheson Gas Data Book and Guide to the Safe Handling of Compressed Gases. Matheson, Division of Searle Medical Products.

Hazards in the Chemical Laboratory. L. Bretherick (Editor) Royal Society of Chemistry, London.

Handbook of Reactive Chemical Hazards. L. Bretherick. Butterworth & Co. Ltd.

Fire Protection Guide on Hazardous Materials. National Fire Protection Association, Boston, MA.

Condensed Chemical Dictionary. Van Nostrand Reinhold Co.

The Merck Index. An Encyclopedia of Chemicals and Drugs, Merck and Company, Rahway, NJ.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. International Agency for Research on Cancer, World Health Organization, Geneva, 1972-1977 (Multivolume work).

Industrial Hygiene and Toxicology. F.A. Patty. John Wiley & Sons, Inc., New York, NY (Five volumes).

Clinical Toxicology of Commercial Products. Gleason, Gosselin and Hodge. Williams and Wilkins, Baltimore, MD.

Casarett and Doull's Toxicology: The Basic Science of Poisons. Doull, Klassen, and Amdur. Macmillan Publishing Co. Inc., New York, NY.

Industrial Toxicology. Alice Hamilton and Harriet L. Hardy. Publishing Sciences Group, Inc. Acton, MA.

Toxicology of the Eye. W. Morton Grant. Charles C. Thomas.

Recognition of Health Hazards in Injury. William A. Burgess. John Wiley and Sons.

Chemical Hazards of the Workplace. Nick H. Proctor and James P. Hughes. J.P. Lipincott Company.

Handbook of Chemistry and Physics. Chemical Rubber Company.

Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes. American Conference of Governmental Industrial Hygienists.

NIOSH/OSHA - Occupational Health Guidelines, including Registry of Toxic Effects of Chemical Substances, The Industrial Environment-its Evaluation and Control, etc.

4. Organizations

(a) Canadian Centre for Occupational Health and Safety, Hamilton, Ont.

(b) Industrial Accident Prevention Association, Toronto, Ont.

(c) Provincial Occupational Health and Safety Jurisdictions.

(d) Health and Welfare Canada, Ottawa, Ont.

APPENDIX III

There are many approaches to weighting or ranking factors within the health effects criterion to account for the severity of the effect. Two different approaches are cited as examples:

1) A weight (total score) can be assigned to each factor and a scoring system could be used to indicate the level of concern.

e.g. **a) Nature of effect (10)**

Score *Category (outcome)*

10 = Fatal

8 = Permanent disability

7 = Teratogenic/embryo toxic/reproductive effects

↓

2 = Chronic irritation (chronic dermatitis)

1 = Minor acute irritation (rash)

0* = No adverse health effect

b) Probability of effect occurring as a result of exposure (1)

Score *Category (likelihood of outcome)*

1 = 100% e.g. All workers exposed will demonstrate the effect

0.9 = 50 - 100%

↓

.1 = Highly unlikely

c) Degree of confidence that the adverse health effect is caused by exposure to the substance

Score *Category*

10 = Certain e.g. proven human carcinogen

8 = Probable e.g. proven animal carcinogen

5 = Quite likely e.g. Positive *in vivo* carcinogenic tests

↓

1 = Unlikely

It is difficult to assign numbers to each factor but even more difficult to determine such scores for the levels of concern within each factor that the integration of the factors (the sum or, as in the example cited above, the product of the scores) will reflect the degree of concern for the health effects associated with a substance. For example, should all suspect carcinogens be considered of greater concern than proven acute toxins?

---

* For all these weighting schemes if there aren't any data on the health effects of a substance it should not be assigned a score of zero. Only when the appropriate tests have been applied and no effect can be demonstrated can a substance score 0.

2) Another approach is to determine the level of concern within each group of adverse health effects:

e.g. **1. Acute toxicity**

Score	*Category*	*Oral LD50*	*Dermal LD50*
7	Extremely Toxic toxic	<5 mg/kg	<5 mg/kg
3	Highly toxic	5-50 mg/kg	5-200 mg/kg
2	Moderately toxic	50-500 mg/kg	200-500 mg/kg
1	Slightly toxic	0.5-5 g/kg	0.5-5 g/kg
0	Relatively non-toxic	>5 g/kg	>5 g/kg
*	Insufficient information		

2. Teratogenicity

Score	*Category*
7	Confirmed teratogen
3	Potential teratogen
0	Not teratogenic
*	Insufficient information

3. Mutagenicity

Score	*Rationale*
7	Two positive tests in any test system
3	Suspect mutagen
0	Not mutagenic
*	No data available

4. Carcinogenicity

Score	*Rationale*
7	Human positive or potential human carcinogen
3	Animal positive or potential animal carcinogen
0	Not carcinogenic
*	No data available

This scoring could be used for initial screening but when used for determining priorities it can be expanded as follows:

Score	**Category**
7	The chemical has been demonstrated to be a human positive, or potential human, carcinogen (defined below)* by the oral, dermal or inhalation routes of exposure based on data reported by the International Agency of Research on Cancer (IARC) or National Cancer Institute (NCI) or National Institute for Occupational Safety and Health (NIOSH).
6	The chemical has been demonstrated to be an animal positive carcinogen as defined in the category above.
3	The chemical has been demonstrated to be a potential animal carcinogen (defined below)* by the oral, dermal or inhalation routes of exposure.
2	The chemical has been demonstrated to be an animal positive or potential animal, carcinogen by any route other than oral, dermal or inhalation, or has been demonstrated by accepted mutagenicity screening tests or accepted cell transformation studies to be a strongly suspect carcinogen (defined below)*.
1	The chemical has been demonstrated by accepted mutagenicity tests or accepted cell transformation studies to be a suspect carcinogen (defined below).*
0	The chemical has been tested by the above systems and has not been demonstrated to cause cancer or to be a suspect carcinogen.
•	Insufficient information.

As can be seen from these examples, the concern score for some effects is simple, while for others, like acute toxicity and carcinogenicity, it is more complex. However, in many cases simplicity is a reflection of the lack of data or lack of adequate predictive tests for a particular health effect. It should be noted also that the health effects that have a predictable dose-response (exposure-effect) relationship (e.g. toxicity) have a weighting that is according to dose and those that have unknown dose-response relationships, or which have a dose-probability relationship, are weighted according to the confidence in the scientific evidence.

The mode or route of exposure necessary to cause the effect also needs to be considered.

If this approach is used, summing the scores for adverse health effects would avoid weighting or ranking the various effects against one another. That is, no value judgements would have to be made about the severity of the various effects.

If any substance has a score of 7 or more it should be considered for control.

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* Each of these terms would then be defined in detail.

The Department of Natural Resources (Michigan) developed and is using such a system and considers:

1. Acute toxicity
2. Carcinogenicity
3. Hereditary mutagenicity
4. Teratogenicity
5. Other adverse effects

as well as criteria for persistence and bioaccumulation that would only be relevant for environmental hazards. The criterion 'other adverse effects' is used to accommodate effects of lesser concern and only carries a total weight equivalent to any of the other individual criteria.

These criteria are very similar to the 'selection elements' being considered by the OECD for determining priorities for testing:

1. Mutagenic effects
2. Carcinogenic effects
3. Embryotoxic and teratogenic effects
4. Effects on reproduction
5. General toxicity and specific organ effects
   a) effects on the immune system
   b) neurotoxic effects
   c) irritation of eye, skin and mucous membrane

An OECD expert group notes that weighting of various types of effects is possible although difficult in practice. So far, no attempt has been made to assign scores for each element or within any of the selection elements. However, for each selection element there is a description of:

- the element;
- the data needed to apply it in priority setting in either a qualitative or quantitative way;
- the application to the priority-setting process: compilation, screening, refinement and review stages;
- the assumptions and limitations;
- the availability of data.

This categorization of information for each selection element will allow the information on each substance selected for study to be analysed on a case-by-case basis. The advantage of this process is that it is designed for substances on which there is inadequate information.

Ontario

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June 7, 1985

Dr. Dennis McCalla
Chairman
Advisory Council
Occupational Health and Safety Division
15th Floor
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

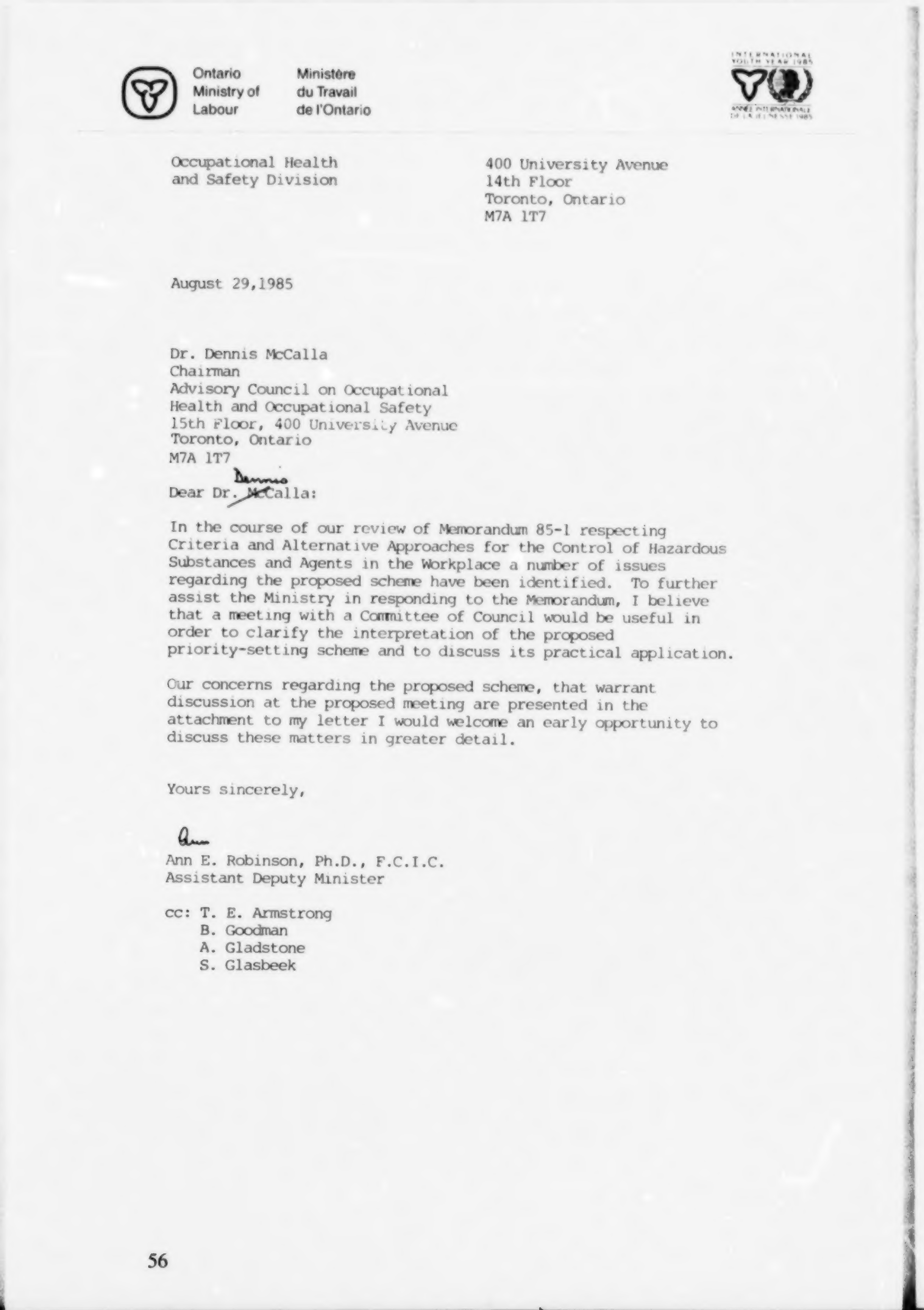
Thank you for transmitting Advisory Memorandum 85-1 on criteria and alternative approaches for the control of hazardous substances and agents in the workplace. I look forward to receiving part 2 identifying alternate approaches for controlling substances in the workplace.

Please thank council members for their efforts in preparing the advice on the criteria for the identification of toxic substances for regulatory control. I would be grateful if you would inform them, on my behalf, that a more detailed response will follow once my officials have had the opportunity to thoroughly review the document.

Yours sincerely,

R. G. Elgie, M.D.
Minister

cc: T.E. Armstrong, Q.C.
Dr. A.E. Robinson
Brian Goodman



Ontario Ministry of Labour
Ministère du Travail de l'Ontario

Occupational Health
and Safety Division

400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

August 29,1985

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
15th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dennis
Dear Dr. ~~McCalla~~:

In the course of our review of Memorandum 85-1 respecting Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace a number of issues regarding the proposed scheme have been identified. To further assist the Ministry in responding to the Memorandum, I believe that a meeting with a Committee of Council would be useful in order to clarify the interpretation of the proposed priority-setting scheme and to discuss its practical application.

Our concerns regarding the proposed scheme, that warrant discussion at the proposed meeting are presented in the attachment to my letter I would welcome an early opportunity to discuss these matters in greater detail.

Yours sincerely,

Ann

Ann E. Robinson, Ph.D., F.C.I.C.
Assistant Deputy Minister

cc: T. E. Armstrong
B. Goodman
A. Gladstone
S. Glasbeek

1) Stage I of the proposed priority-setting scheme deals with the identification of hazards and outlines criteria to be employed in determining which substances are toxic and may present a risk in Ontario work places.

Stage II is described as a systematic approach to risk estimation and evaluation that can be used to set priorities for further investigating substances. This stage involves the construction of a 'priority graph' for the substances under consideration, (i.e., list of substances obtained from Stage I), by plotting the number of workers estimated to experience an adverse health effect against the impact in humans.

In the determination of the impact of the adverse health effect(s) associated with exposure to a particular substance, Council suggests that the severity of the outcome and the reversibility of the effect are important considerations and puts forward a simple weighting scheme which may be used. The number of workers estimated to be experiencing an adverse effect is to be determined from data on the number of workers exposed to that substance in Ontario, the levels to which they are exposed and dose-response data for the substances in question. The ranking of substances in order of priority is to be carried out after all substances identified as hazards in Stage I have been investigated and plotted on the 'priority graph'.

A major problem associated with the adoption of the priority-setting scheme proposed is that it is assumed in Stage II that the information needed for the construction of the 'priority graph' is readily available when in fact, for the majority of substances, it is not. At the present time, the only means of obtaining the necessary information is for two studies to be undertaken. One is a background study which provides information on the number of workers exposed to a particular substance in Ontario and gives an indication of what the exposure levels are in a small number of work places as well as the types of control measures in place. The other which is part of a health effects study is an attempt to define the dose-response relationship.

From our experience with the designated substances, these studies involve a considerable amount of work and are time-consuming. Given our resources at the present time, it would be impossible to undertake concurrent background studies and prepare health effects documents for all substances deemed hazardous. Furthermore, for most substances there is likely to be very little information, if any, on toxicity and exposure, upon which a dose-response relationship can be established. This further complicates the task of obtaining the necessary information for construction of the graph.

Assuming that we had the resources needed for carrying out these studies on all substances and that the necessary information could be obtained from these studies, in essence what we would be doing is carrying out the studies needed for the development of control strategies before ranking the substances in order of priority. This would seem to defeat the purpose of establishing a priority-setting scheme.

Council acknowledges the difficulty in the systematic application of its scheme given the present paucity of information. In order to help fill the information gap Council has made several recommendations (85-3 to 85-5) regarding approaches that can be taken to obtain the necessary information.

The feasibility and practicality of implementing these recommendations has not been thoroughly examined at this time. Should they be implemented it will take a considerable amount of time to put them into effect and even longer before they are able to provide the information needed for the priority-setting scheme.

2) In the discussion outlining the development of a 'priority graph' (pages 8-16), the chemical benzene is used to exemplify the development of the graph. As exposure to benzene is linked to a number of adverse health effects (4 are given in this example), it is recommended that the risk, of workers experiencing the different health effects, be calculated individually and plotted separately on the priority graph.

Council also recommends that separate risk estimates should also be made if the exposure levels vary significantly according to the industry or the process.* Using benzene still as the example, if the risk of workers experiencing the four different health effects noted is calculated for two different worker-weighted average exposure levels, it is possible that benzene will be represented in eight different areas of the graph. Assuming that this procedure is repeated for several substances, never mind the possible hundreds of hazardous substances identified in Part I, it seems unlikely that any meaningful interpretation of the graph will be able to be made. It is envisaged that there will be many substances occupying the same area of the 'priority graph' which will make the ordering of priorities very difficult, if not impossible.

---

* Note: This is likely to be a common, rather than rare, occurrence.

3) One of the difficulties encountered by the Ministry in priority setting is the determination of priorities between substances known or suspected of causing a severe impact in a few workers, and those known or suspected of causing a less severe effect but affecting a much larger number of workers. For example, is it more important to control a substance estimated to cause death in one Ontario worker or an agent estimated to result in a hearing loss in 1,000 workers.

This difficulty is noted but is not addressed in Council's memorandum and therefore still remains as a problem even if Council's priority-setting scheme is adopted. Using the priority-setting scheme proposed by Council value judgements are very necessary in the determination of priorities amongst substances located in different areas of the 'priority graph'.

4) Council refers to the current approach to control strategy development used by the Ministry as the "sore thumb" approach. This is defined by Council as the control of substances that have been demonstrated to cause adverse health effects and have elicited widespread publicity. There is no doubt some truth in this statement. However, there was and will continue to be a need to be sensitive to public perception and to react positively to control substances when new information of an adverse effect on human health becomes known.

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March 24, 1986

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I am now in a position to respond to Part I of Council's Advisory Memorandum 85-I on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Work Place, which deals with the process of assigning priorities for further investigating substances which are likely to pose a risk to the health of Ontario workers.

While the Ministry accepts Council's proposal in principle, my officials in the Occupational Health and Safety Division have concerns regarding the practicality and feasibility of proceeding with the implementation of Council's proposed priority-setting scheme at the present time. As noted and elaborated in Dr. Robinson's letter to Council dated August 29th, 1985 and subsequently discussed at a meeting with Council held on October 11th, 1985, the necessary information for proceeding with the priority-setting scheme proposed is currently neither available to the Ministry, nor is there any data collection system in place which would provide that information in the near future.

I note that Council's memorandum has identified these information needs also and has made several recommendations for improvement. I am pleased to inform Council that the Ministry is working on initiatives in keeping with those suggested by Council which will serve as a starting point in meeting the broader information needs of the Ministry.

This Minister believes that the first step to improving the Ministry's information base is the introduction of comprehensive right-to-know legislation. Toward that end, on January 31st, 1986, a Bill to amend the Occupational Health and Safety Act (the Act), to provide workers with the right to know about potential hazards in the work place, was introduced for first reading in the Ontario legislature. When enacted, such legislation in addition to provisions for labelling, material safety data sheets and worker training programs as recommended in the Workplace Hazardous Materials Information System (WHMIS) report, would include a requirement that employers prepare and submit to the Ministry, an inventory of all hazardous substances in the work place. By requiring the submission of inventories, the Ministry will be in a better position to identify those hazardous chemicals which are in use in Ontario, in which work places these substances are present, and approximately how many workers may be at risk. While the inventories will not yield precise information as to the nature and extent of worker exposure, they would be of considerable value for purposes of priority setting. The Ministry is currently considering the technology necessary to enable the information provided by the inventories to be of assistance in priority setting.

The Ministry is also actively developing a regulation to control hazardous substances, that will apply to all work places covered by the Act. This regulation will formally adopt, as guidelines, exposure values for biological and chemical agents and will place emphasis on the use of engineering controls as opposed to the use of personal protective equipment. I refer to my speech in the House on November 21st, 1985, a copy of which is attached. One of the many positive aspects in developing such a regulation is the anticipated increase in awareness by both workers and employers in the province, of the maximum allowable exposure limits to potentially hazardous substances present in their work places. It is hoped that such increased awareness will facilitate and encourage the self-monitoring of exposures. Another positive aspect of this proposed regulation is that there will be better control over the many potentially hazardous substances for which designated substances regulations do not yet apply.

At the present time, the Ministry is not considering making a general requirement that work and exposure histories be maintained for all workers exposed to potentially hazardous agents in the work place, nor am I aware of any jurisdiction in the western world that has enacted such a provision. The imposition of such a requirement with the consequent considerable resource implications, would first require a thorough assessment to ensure that the benefits would warrant the costs and should such a requirement be imposed, there would need to be a requirement for notification to the Ministry, if the information is to be of use in the priority-setting process. My officials will keep this recommendation under review if and when such a requirement should become more feasible to implement.

The present Ministry approach to priority setting in relation to the control of potentially hazardous substances includes consideration of health effects, the extent of worker exposure in Ontario, a review of occupational disease claims submitted to the Workers' Compensation Board, public concerns, available control measures and other relevant factors. Because of the absence of data without which no priority-setting scheme can be established, the Ministry is obliged to continue to use the current approach. When a mechanism for obtaining additional data is put into place, such as by the submission of inventories as provided for in the right-to-know legislation, further consideration will be given to the thoughtful memorandum provided by Council.

I wish to thank Council for the attention it has given this issue.

Sincerely,

William Wrye
Minister

Advisory Memorandum 85-II

Advisory Council on Occupational Health & Occupational Safety
Conseil consultatif de la santé et de la sécurité au travail
Ontario

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Office of the Chairman
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October 17, 1985

The Honourable William Wrye
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Minister:

On behalf of the Advisory Council, I am pleased to submit Advisory Memorandum 85-II on the classification of health surveillance, health screening and biological monitoring procedures in workplace biomedical surveillance programs.

Council believes that the classification framework set out in this memorandum represents an appropriate alternative to the current approach to the selection of procedures for inclusion in biomedical surveillance programs in Ontario workplaces.

The memorandum does not deal with issues which arise from the results of biomedical surveillance, such as the important issue of the mandatory removal of workers.

I hope that you will find the suggestions contained in this document to be useful.

Yours truly,

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Advisory Memorandum 85-II
to the Minister of Labour
October 17, 1985

Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs

INTRODUCTION

Health surveillance, health screening and biological monitoring procedures have been a factor in the Ontario workplace for many years. Under the designated substance regulations promulgated under the *Occupational Health and Safety Act*, some of these procedures have now been legally mandated. While the regulations are not the first legislation in Ontario to require regular medical examinations of workers, they are the most detailed and the most specific. At the same time that the regulations are being introduced, however, many strategies for periodic health evaluation are coming under fire as being ineffective both as tools in the early detection of disease and as fundamental devices for health maintenance in general.[1] The major recommendation of the Canadian Task Force on the Periodic Health Examination, for example, was that the routine annual medical check-up be abandoned in favour of a selective approach that is determined by the patient's age and sex.[2] A similar critical re-evaluation is now becoming apparent in occupational medicine.[3] The necessity for, and value of, many of the health surveillance, health screening and biological monitoring procedures currently in use in the workplace is being questioned.[4]

The advisory council feels, however, that any re-evaluation of biomedical surveillance procedures used in the workplace should be conducted using a systematic, co-ordinated, industry-wide approach and should include a consideration of the social as well as the scientific aspects. This memorandum sets out a classification framework for determining which procedures must be offered to workers, which may be offered, and which should not be used at all, and for determining which procedures should be mandated and which should be offered to workers on a voluntary basis only. No attempt will be made in this document to assess the scientific validity of any specific biomedical surveillance procedure.

The advisory council wishes to emphasize at the outset that health screening, health surveillance and biological monitoring procedures should be viewed as complementary to good industrial hygiene procedures and should not be seen as a substitute for proper engineering controls in the workplace.

DEFINITIONS

Four key terms that will be referred to frequently in this discussion are health screening, health surveillance, biological monitoring and biomedical surveillance. These terms are defined below. (Council recognizes that these terms can be, and have been, defined in somewhat different ways).

Health Screening – the presumptive identification of unrecognized disease or defect by the application of tests, examinations or other procedures that can be applied rapidly. Screening tests sort out apparently well persons who probably have a disease from those who probably do not. Screening is an initial examination only, and positive responders require a second, diagnostic, examination.

Health Surveillance – the continuing scrutiny of specific worker subgroups for the purpose of identifying disorders or health states. Health surveillance involves procedures such as laboratory testing and detailed clinical examinations that evaluate physiological changes and/or evidence of pathology, allowing for a more detailed diagnosis of health conditions.

Biological Monitoring – the process of measuring the 'absorption of' rather than the 'exposure to' hazardous substances in the workplace. It is a tactic that may be utilized in the course of either health screening or health surveillance. Biological monitoring involves the sampling and analysis of such specimens as blood, urine, feces and sputum. Such sampling is normally conducted at pre-determined times or intervals. An example would be the procedures for determining the level of lead in the blood and urine of individual workers, which are set out in the Regulation respecting Lead. While some occupational health physicians have extended biological monitoring to include clinical function tests, for the purposes of this document such tests will not be considered as part of biological monitoring but as part of health screening and health surveillance.

Biomedical Surveillance – an all inclusive term used in this document to include health surveillance, health screening and biological monitoring.

BIOLOGICAL MONITORING

Since biological monitoring procedures may form part of both health screening and health surveillance programs they will be discussed first. As has already been noted, biological monitoring is a measure of the 'absorption of', rather than the 'exposure to' hazardous substances in the workplace. While biological monitoring procedures should not be considered as substitutes for the use of air monitoring, there are specific instances in which biological monitoring provides a better measure of worker exposure than does air monitoring, as, for example, in situations in which a harmful agent is absorbed through the skin or is ingested.

Biological monitoring is by no means an exact science. The sensitivity, specificity and predictive values of many procedures are uncertain.[5] Individuals with virtually identical exposure histories can show widely divergent test results. These variations may be influenced by such factors as the timing of sample collection, the individual's age, sex and metabolism, the rate of absorption and rate of excretion of the substance, the individual's nutritional habits, the ingestion of drugs, and any past or present disease states. In those instances where test results show considerable variation between individuals, the trend of an individual's test results over time may be more important than test result variations noted among members of a relevant subpopulation.[6] For certain types of monitoring, such as that for mercury and lead, the group data may be more valuable than the individual data in demonstrating the adequacy of control of the working environment.

A number of variables must be considered in determining which monitoring procedures are best suited to measure an individual's absorption of a particular substance. These variables may include: the degree to which the material and testing procedure accurately estimate the body burden of the substance (i.e. the total amount of the substance in the body at the time of sampling); the feasibility and acceptability of the sampling method; the route of exposure and the cost of the sampling method.

The most frequently utilized biological monitoring tests are those that measure the levels of toxic agents or their metabolites present in body fluids, typically, blood and urine, and in breath and sputum. For most toxic substances, blood is the body fluid that should show the best correlation between exposure to a substance, amount absorbed, degree of retention and severity of effect.[7] Because of practical considerations, however, such as the difficulties associated with the taking of frequent blood samples, this fluid is often avoided in favour of either urine or sputum.[8] There may, however, be difficulties associated with obtaining quality results when sampling any body fluid. Urine is the most frequently utilized biological sample since the fluid is relatively easy to collect and because urine ordinarily reflects the presence of all exogenous chemicals or their metabolites in the body in rough approximation to the absorbed dose.[9] In addition to those already mentioned, a number of other biological materials may also be analysed for evidence of exposure. The list includes hair and nail clippings, feces, adipose tissue, breast milk and chromosomal material. While each specimen type offers specific advantages in different situations, each test is also fraught with its own difficulties with respect to collection, storage and analysis.[10]

HEALTH SCREENING

Occupational health screening procedures can be broadly divided into two main types of health examination or assessment: preplacement examinations of job applicants, including applicants for job transfers within a particular workplace, and periodic health screening procedures conducted in the workplace.

Perhaps the most controversial of the two types of procedure is the preplacement medical examination or assessment. This can range from the most perfunctory examination to a very detailed and sometimes intrusive investigation into a job applicant's physical condition, medical history and lifestyle. Ideally, the purpose of the preplacement medical examination should be to recommend to an employer the conditions under which the prospective employee might function safely and effectively and to ensure that the individual is placed in a job that is both within his capabilities and that will not jeopardize his safety or the safety of others.[11] There are a number of situations in which preplacement medical examinations are required by law in Ontario.[12]

Some of the objectives of preplacement medical examinations that have been cited are that:

- they help to determine the employee's physical capacity to perform the job in question;

- they identify medical conditions that might prevent the safe performance of an assigned task;
- they facilitate the placement of handicapped workers;
- they provide baseline medical information that can be used as a standard in the event of subsequent injury or illness; and
- they identify, for the individual, previously unrecognized or inadequately managed health problems.

In the past, preplacement examinations have sometimes been used to reject suitably qualified and able job applicants on arbitrary medical grounds. The extent to which employers can exclude prospective employees from the workplace on medical grounds, however, has now been qualified by the Ontario *Human Rights Code* R.S.O. 1981, c.53, which protects handicapped persons from discrimination with respect to employment.[13] The very broad definition of handicap in the Code[14] covers past, present and perceived handicaps including: physical disability, mental retardation, learning disability and mental illness, and is also intended to 'protect the victims of past injuries, including those who have received workman's (SIC) compensation benefits!'[15] Since the scope of this definition has yet to be tested, it is unclear whether it will include 'hypersusceptible' workers.[16]

Once it has been established that an otherwise qualified applicant falls within the definition of 'handicapped', the onus is on the employer to prove that the individual was refused employment because he or she 'is incapable of performing or fulfilling the essential duties or requirements' of the job.[17] Thus, the exception is established only where the person '*is* incapable' not where the person 'may be incapable' or 'is judged incapable.'[18] The narrow scope of this section is also demonstrated in the phrase 'the *essential* duties and requirements'; 'peripheral or incidental, non-care or non-essential aspects' of a job are not pertinent.[19] A distinction must be drawn, therefore, between screening workers who lack the present ability to perform the job and screening that attempts to forecast the risk of future injury or illness. When an individual's present physical condition, even with reasonable accommodation, precludes the performance of essential job functions, it is neither illegal nor unfair for this individual to be denied the particular job. In situations in which it is not obvious from mere observation that a person cannot perform the essential functions of a job, the person must be given the opportunity to prove his abilities.[20] Generally, board decisions have reflected the principle that individuals must be assessed on their own merits rather than disqualified without consideration of their abilities because of a generalization on the part of the employer. Canadian tribunals have, in the past, however, imposed a lower standard of proof on an employer where public safety is at stake, especially where scientific evidence is difficult or impossible to obtain.[21]

Therefore, while there is still a place for the preplacement examination, the Code indicates that the content and nature of the examination should relate to the content and nature of the job. A simple questionnaire may be all that is necessary for some situations, while others may require a more comprehensive approach.[22]

However, in order to exercise his rights under the Code, an otherwise qualified handicapped applicant must be aware of the reason for an employer's refusal to hire him. It is council's opinion that this obstacle could be overcome by a requirement that preplacement medical examinations not be performed until after the applicant has been offered employment on a provisional basis. In this way a handicapped person will be made aware that a rejection at this stage must be on the grounds of a physical or medical condition that the employer feels would prevent the applicant from performing the specific job.

The *Human Rights Code* does not specifically set out this requirement, but it is council's understanding that the Ontario Human Rights Commission is currently reviewing its policy on this issue in light of recent case law.

ACOHOS RECOMMENDATION 85-6

> that the Minister of Labour, in consultation with the Ontario Human Rights Commission, take the necessary steps to ensure that preplacement medical examinations are not conducted until after a job applicant has received a conditional offer of employment.

HEALTH SURVEILLANCE

The primary objectives of an occupational health surveillance program are to promote the health of workers and to prevent the occurrence of occupational diseases and injuries. The possible subsidiary objectives include:

- the early detection and possible treatment of health problems that may develop as a result of worker exposure to harmful substances and factors present in the workplace;
- the monitoring of worker health during employment;
- the assessment of the effectiveness of preventive measures implemented in the workplace;
- the identification of failures in control systems and personal protective devices;
- the generation of hypotheses and possible data for use in future epidemiological studies;
- the opportunity to provide education to employees regarding occupational health and safety.

One of the more common criticisms of health surveillance programs has been that they may cause attention to be focused on the worker rather than on the worksite where the health hazards arise, thus shifting the emphasis away from the necessity for engineering controls. Furthermore, some procedures lack sensitivity and/or specificity and, therefore, may produce unacceptably high false negative or false positive test results. Problems of this nature may arise because a test is inherently inaccurate and/or because the procedure is conducted under poor quality control conditions. A procedure that lacks sensitivity, and which, therefore, may not indicate that a worker is suffering from exposure to a particular substance, may provide the worker with a false sense of security in respect to his health status. A procedure that lacks specificity, on the other hand, may cause workers to undergo unnecessary and possibly discomforting follow-up procedures and, perhaps, to face transfer or even loss of his or her job. In addition, the results obtained from health surveillance programs may serve to label a worker diseased or at high risk. This could produce two undesirable effects. First, the labelled worker might find it difficult to obtain employment and, second, the health of a worker might deteriorate simply because he has been labelled unhealthy. Furthermore, there is a fear among some workers that the results of a health surveillance examination may not remain confidential.

As with preplacement medical examinations, a number of health surveillance procedures are mandated by law, for example, those required under the designated substance regulations.

A FRAMEWORK FOR CLASSIFYING HEALTH SURVEILLANCE, HEALTH SCREENING AND BIOLOGICAL MONITORING PROCEDURES

At the present time, there is no overall approach to biomedical surveillance in the Ontario workplace. The advisory council considers that the issues of health surveillance, health screening and biological monitoring in the workplace should be approached in a more systematic and scientifically sound manner than in the past, with the onus being on those advocating the use of a particular procedure to demonstrate either that the procedure clearly benefits workers or that there are overriding societal reasons for the worker to be required to undergo the procedure. In order to assist in this process, council has developed a classification framework (page 77) together with criteria for determining how specific biomedical surveillance procedures should be classified within this framework.

The first set of criteria is to be used to determine whether a procedure must be offered to workers, may be offered or should not be used at all, and the second is to assist in the determination of whether a worker's consent should be a prerequisite to his undergoing the procedure. The application of these two sets of criteria to specific biomedical surveillance procedures would place each procedure within one of four categories. These are:

A. procedures that *must* be offered to workers and that are *compulsory*;
B. Procedures that *must* be offered, but only on a voluntary basis;
C. Procedures that *may* be offered, also on a voluntary basis, and
D. Procedures that must *not* be offered.

The criteria are not listed in any perceived order of importance, and the advisory council has not attempted to develop a weighting process.

I. Criteria for Determining Which Biomedical Surveillance Procedures Must Be Offered to Workers, Which May Be Offered, and Which Should Not Be Offered

Decisions on whether to launch or continue specific biomedical surveillance programs will best serve those whom they are intended to protect when those decisions are based upon firm scientific evidence. This position is supported by both history and logic. History has taught us, for example, that one cannot rely on frequent routine chest X-rays to reduce lung cancer death rates among working men.[24] Furthermore, logic gives us two reasons why early detection will appear to improve outcomes even when therapy is worthless.[25] First, the failure to correct the starting date of the survival measurement for the 'lead time' gained through early diagnosis will falsely inflate the usual calculation of five-year survival rates.[26] Second, for several types of cancers, there is a relationship between the pre-clinical[27] and clinical stages of tumours. That is to say, tumours with longer pre-clinical stages (slowly growing tumours) may also tend to exhibit longer clinical stages. Conversely, tumours with relatively short pre-clinical stages (rapidly growing tumours) may tend to manifest short clinical stages. Early detection procedures are more likely to discover slowly growing tumours than rapidly growing ones simply because the period of time over which detection could occur is lengthier for the first class of tumour. Since persons with slowly growing tumours are also likely to survive for relatively long periods of time (because of slow pre-clinical and clinical tumour development) early detection procedures may be seen as improving short-term survival rates, even where the therapy instituted as a result of early diagnosis is worthless. In this respect, the screening of asymptomatic persons will falsely appear to improve prognoses.[28]

The failure to take into account a further type of measurement error – the patient self-selection bias – may also lead to the inference that a surveillance of screening programs is improving survival when, in fact, it is not. The principle underlying the patient self-selection bias is that individuals who choose to submit to surveillance or screening procedures may be different from individuals who elect not to participate. For example, participants may be more health conscious, better able to control risk factors and more willing to comply with treatment.[29] Any one of these factors could produce higher survival rates, irrespective of the merits of early detection procedures. The patient self-selection may become especially important in the evaluation of surveillance and screening procedures that are conducted on a voluntary basis.

For the reasons indicated in the examples above, programs designed to achieve the early detection of disease need to be rigorously evaluated to determine whether they truly benefit those whom they are designed to help. In response to this concern, the advisory council has assembled a list of criteria that it considers should be utilized as a basis for determining whether particular biomedical surveillance procedures produce more benefit than harm to the individual worker. In council's view, these criteria can be divided into two categories – basic criteria and evaluative criteria. Basic criteria are essentially scientific standards from which the validity and efficacy of a test can be judged. Evaluative criteria, on the other hand, are standards for judging the desirability of a procedure based on social values and other considerations. Many of the criteria that the advisory council has included in its inventory have been adapted from criteria lists contained in two World Health Organization documents on mass health screening[30] and the use of biological monitoring in the workplace.[31] The most important basic and evaluative criteria are set out below.

Basic Criteria

- The intervention in question (i.e. the preventive or therapeutic action) must not simply advance the point in time at which the diagnosis of disease occurs, but must also improve survival or function or both. Claims for effectiveness must be supported by experimental evidence (such as that obtained from randomized control trials) and must withstand rigorous methodological scrutiny.

- Available health services must be sufficient to ensure diagnostic confirmation among those whose screening is positive and to provide short- and long-term care.
- Acceptability for treatment among asymptomatic patients in whom an early diagnosis has been achieved must be sufficient to alter the natural history of the disease in question.
- The sensitivity and specificity of the diagnostic procedure must be known.[32]
- The levels of a contaminant measured in blood, urine or exhaled air, for example, (or the measurements of metabolites or biological changes that result from the absorption of the contaminant) should reflect a quantitative relationship with an adverse health effect.
- The test should have the ability to detect an adverse biological effect caused by exposure to a workplace agent when the effect first materializes[33] (i.e. at a low level of environmental exposure).
- Where possible, the deviation of the test data from normal values should increase quickly with the intensity and/or duration of exposure.
- The effectiveness of potential components of multiphasic surveillance or screening[34] should normally be demonstrated individually before being offered in combination.[35]
- The health risks, if any, posed by the test or intervention must be known.

Evaluative Criteria

- The burden of disability[36] for the condition in question (in terms of disease frequency, distribution, severity and alternative approaches to its detection and control) should warrant action.
- The test or intervention should not carry an unreasonable risk to health and should be as convenient as possible for the workers involved.
- The costs and benefits of surveillance, screening and short- and long-term therapy must be known.[37] In this respect, there should exist as part of any surveillance or screening program a mechanism for the formal, periodic weighing of costs against benefits.
- The short- and long-term benefits of a testing regimen, in terms of end results, must outweigh the short- and long-term detrimental effects of the regimen and the labelling[38] of participants as either diseased or at high risk.
- Ideally, an estimate of the social benefit of detecting, preventing, arresting or curing the condition in question should be known.
- If the benefits of surveillance or screening accrue to members of the community at large (e.g. through the identification of disease carriers) rather than to individual workers, the community benefits must withstand scientific scrutiny.
- Mechanisms should be available to ensure that good quality control is maintained in relation to both the administration of test procedures and the evaluation of test results.
- Biological tests should only be undertaken when the procedures yield information of a higher quality than could be made available through other means (e.g. through environmental monitoring).
- Mechanisms must exist to ensure that individuals to whom tests are offered are provided with information on the nature and purposes of

the procedures, the uses to be made of test results and the health risks associated with the tests.

In the advisory council's view, both the basic and the evaluative criteria described above must be satisfied before surveillance or screening procedures are offered to workers. In the case of tests conducted for research purposes, however, it is not essential that all of the criteria be fulfilled provided that participants are supplied with complete information on the nature and purposes of the testing and the overall objectives of the research. These individuals must also be told that they have the right to refuse to take part in the research project.

II. Criteria for Determining Whether Specific Procedures Should Be Mandatory or Voluntary

The performance of a medical procedure without the patient's consent is a breach of common law. Typically, the patient freely consults a physician and receives medical advice, which he or she is free to follow, ignore or seek another opinion on. In the area of occupational health, however, many of the essential voluntary aspects of the patient/physician encounter are missing. In the workplace individuals are required to undergo medical tests or procedures, either because to do so is part of the conditions of employment or because the tests or procedures are required by legislation. A worker who refuses to consent to a required biomedical surveillance examination may risk discipline or dismissal.

There are three approaches that can be taken on the issue of consent, and each will be discussed briefly below. It should be noted that the arguments are not necessarily accepted by council as conclusive, but represent a general consensus of those that have been put forward both for and against mandatory or voluntary testing. (An 'approved' procedure is one that has been demonstrated to produce more benefit than harm to a worker according to the criteria set out in this document.)

a) *All 'Approved' Procedures Should Be Mandatory*

It can be argued that a scheme of mandatory biomedical surveillance would benefit individual workers since such surveillance can potentially identify workers who experience physiological changes due to exposure to hazardous substances before these workers develop occupational diseases, and this would help to prevent disability. Mandatory programs would also benefit workers as a group since biomedical surveillance programs can generate data both for future epidemiological research and for the identification of presently unrecognized hazards. A mandatory program would, by its very nature, engender high rates of worker participation, thereby helping to facilitate the achievements of these objectives. Such programs also create fewer administrative difficulties than would be the case under a voluntary program.

On the other hand, if workers who believe that a medical procedure would do them more harm than good must, nonetheless, undergo the procedure under a mandatory program, such an approach may create unnecessary anxiety and resentment. Compulsory biomedical surveillance programs may also discourage workers from being frank about disease symptoms because of a fear of the employment consequences. There is also a strong feeling that workers are being used as 'guinea-pigs' to determine whether employers are complying with the legislation. Furthermore, mandatory medical monitoring procedures would seem to be at odds with the philosophy of co-operation and internal responsibility on which the *Occupational Health and Safety Act* is based. The advisory council is of the opinion, therefore, that this approach should be rejected.

b) *All 'Approved' Procedures Should Be Voluntary*

An approach that allows completely voluntary participation is consistent with the common law principle that medical procedures should not be carried out before the patient has given his free and informed consent. In addition, a voluntary scheme could be expected to engender a fuller degree of worker trust, confidence and co-operation in medical surveillance programs.

Voluntary surveillance schemes, however, have often been shown to achieve relatively low levels of worker participation, thus reducing the data available for future epidemiological research.[30] It has also been argued that since society, in one form or another (through WCB payments or OHIP benefits, for example), must bear some of the costs associated with a worker's occupational disease, the worker should be required to take all reasonable steps to minimize the seriousness of the disease. One such reasonable step involves mandatory participation in an appropriate medical surveillance program. Finally, in situations in which members of the public or fellow workers might be endangered if an individual worker's medical condition diminishes that worker's capacity to perform his job safely, such workers must be identified. Council is of the opinion, therefore, that a completely voluntary approach should be rejected.

c) *All Procedures Should Be Voluntary, With Exceptions Only Where Compulsory Participation Can Be Justified*

In recommending this approach to the administration of health surveillance, health screening and biological monitoring procedures the advisory council believes that the guiding principle should be a respect for the individual worker's basic right to personal integrity and confidentiality. Therefore, before this basic right can be infringed, the onus must be on those advocating that a specific procedure be mandated to demonstrate cogent and overriding reasons why workers should be required to undergo the procedure. Council is of the opinion that a number of criteria are relevant to this decision, including the following:

- Who is at risk? In some situations co-workers and/or members of the public could be endangered by the consequences of a worker's medical condition.
- What is the nature of the risk?
- What is the degree of risk?
- Does the procedure involve a collective benefit? For example, is the procedure part of a surveillance program designed to detect hitherto unsuspected health problems in a specific workplace or industry?

- Is health surveillance and/or biological monitoring the only method of monitoring a worker's exposure to toxic substances in the work environment?

Should it be determined that a particular medical surveillance procedure must be offered to workers, but not mandated, and should a worker agree to undergo the procedure, his consent must be fully informed and truly voluntary. Consent may be said to be informed when the worker has been apprised of the nature and effect of a particular medical procedure, any risks that may be attached to it and the availability, if any, of a feasible alternative. The decision may be said to be truly voluntary if the worker knows that he or she could decline with no risk of discipline or other adverse reaction.[40]

As a matter of principle, workers required to undergo *mandated* procedures should also be fully informed of the nature and effect of the procedure *and* of the employment consequences, if any, of refusal in order to ensure that any decision to refuse would be a fully informed one. The employment consequences of refusal should be determined at the time that the procedure is made compulsory and should be specified.

The advisory council is of the opinion that the classification scheme set out in Figure 1 represents an appropriate framework in which to consider the selection of procedures for inclusion in biomedical surveillance programs currently undertaken in Ontario workplaces. Ideally, all occupational biomedical surveillance procedures would be classified by a central group of decision makers to ensure a consistent, industry-wide approach. A mechanism would also be provided for an ongoing review of classifications in light of new scientific and medical evidence. Council recognizes the complexity of this task, but believes that the ministry could begin to work towards this goal by applying the criteria to the biomedical surveillance procedures set out in the medical codes of the designated substance regulations.

APPLICATION OF THE CRITERIA TO THE DESIGNATED SUBSTANCE REGULATIONS

The advisory council is of the opinion that a number of the procedures set out in the medical codes for the designated substance regulations are of dubious value in attempting to fulfil the primary objectives of a biomedical surveillance program. In its Advisory Memorandum 83-II, for example, in which council reviewed the process used to develop the regulation for silica, council noted that it remained 'unsatisfied with respect to the value of pulmonary function tests', and was of the view 'that these tests are of questionable value for routine use in the silica medical surveillance program.'[41]

The advisory council recommends, therefore, that all biomedical procedures contained in both current and future regulations regarding the control of hazardous substances in the workplace be classified according to the criteria set out in this document. Council further recommends that an independent advisory group, made up of medical and scientific experts, be set up under subsection 11(1) of the *Occupational Health and Safety Act* to apply the criteria and to advise the minister accordingly. The advisory group would have a two-part mandate:

a) to review all biomedical surveillance procedures described in the medical codes of current designated substances regulations in light of the classification scheme set out in this memorandum. The group's advice to the minister should be circulated by the ministry to interested and affected parties for comment prior to the minister making his final decision. Any amendments to the regulations as a result of this process would be reviewable by the advisory council in its role of reviewer of the standard-setting process.

b) to classify biomedical surveillance procedures that are to be included in any future regulations relating to the control of hazardous substances in the workplace. The group's advice should be given early enough in the regulation-making process to be included in the background material that accompanies a draft regulation when it is circulated to outside parties for comment. Again, the resulting medical codes would be subject to review by the Advisory Council as part of its general review of the process used to develop each regulation.

In any case in which the minister's decision regarding a particular biomedical surveillance procedure differs from that advised by the independent group of experts, the minister should set out, and make public, the rationale for his decision.

ACOHOS RECOMMENDATION 85-7

that the Minister of Labour appoint an advisory committee of independent medical and scientific experts under subsection 11(1) of the *Occupational Health and Safety Act* to classify, according to the criteria set out in this memorandum, the biomedical surveillance procedures contained in the medical codes of current designated substance regulations, including those to be set out in the medical codes of any future regulations regarding the control of hazardous substances in the workplace.

ACOHOS RECOMMENDATION 85-8

that the Minister of Labour take the necessary steps to ensure that the advisory committee's advice to him is circulated to interested and affected parties prior to his making a decision concerning the classification of any biomedical surveillance procedures set out in the medical codes of current or future regulations for the control of hazardous substances in the workplace.

ACOHOS RECOMMENDATION 85-9

that the Minister of Labour, if he chooses not to accept the advice of the independent committee of experts, set out in writing and make public his reasons for not doing so.

ACOHOS RECOMMENDATION 85-10

that the Minister of Labour take the necessary steps to ensure that workers undergoing health surveillance, health screening and biological monitoring procedures, whether these procedures are mandated or not, are fully informed of the nature and effect of the procedure, the risks involved and the availability, if any, of a feasible alternative.

ACOHOS RECOMMENDATION 85-11

that the Minister of Labour take the necessary steps to ensure that no health surveillance, health screening or biological monitoring procedure be mandated without the employment consequences of non-compliance being clearly specified to the worker.

CONCLUSION

The advisory council recognizes that the issues surrounding biomedical surveillance programs in the workplace are complex, having not only significant scientific, medical and social components but also ethical and political aspects. Council believes, however, that even within the limitations imposed by the lack of relevant scientific and medical data, a more systematic and consistent approach can be taken. The application of the classification scheme using the criteria developed by council should assist in this process.

Figure 1: A Framework for Classifying the Health Surveillance Procedures Offered in Workplaces

Category	Must the Procedure Be Offered to Workers?	Must the Worker Undergo the Procedure?
A	Yes.	Yes.
B	Yes.	This matter is left up to the worker.
C	The procedure may be offered.	This matter is left up to the worker.
D	The procedure must not be offered.	No.

Note: Criteria for determining how specific biomedical surveillance procedures should be classified within the framework are set out in the preceding text according to
I. Criteria for Determining Which Biomedical Surveillance Procedures Must Be Offered to Workers, Which May Be Offered, and Which Should Not Be Offered.
II. Criteria for Determining Whether Specific Procedures Should Be Mandatory or Voluntary.

Footnotes

1. Guidotti, Tee L., Adaptation of the Lifetime Health Monitoring Concept to Defined Employee Groups Not at Exceptional Risk. *Journal of Occupational Medicine*, Vol.25, No.10, Oct.1983, pp.731-6.

2. Canadian Task Force on the Periodic Health Examination: The Periodic Health Examination. *Canadian Medical Association Journal*, Vol.121, Nov. 1979, pp.1193-1254.

3. The Federal Task Force on Health Surveillance of Workers, which was set up in 1982 by Health and Welfare Canada, is currently evaluating the scientific validity of health surveillance procedures in common use in industry. This analysis was undertaken within the following framework: Does the manoeuvre benefit the individual worker? Does the manoeuvre have a potential for harm? Does the manoeuvreprovide valid information concerning the health of groups of workers?

4. Atherley, G., Johnston, N. and Tennessee, M., Biomedical Surveillance: Rights Conflict With Rights. Presentation by the Canadian Centre for Occupational Health and Safety at the NIOSH conference, Washington, Fall 1984.

5. See Note 32 *infra*. The predictive value (positive) of a test measures the likelihood that a positive test result indicates the presence of the condition.

6. International Labour Office, Occupational Exposure to Airborne Substances Harmful to Health. (Geneva, Switzerland, 1980) p.25. See also World Health Organization, Early Detection of Health Impairment in Occupational Exposure to Health Hazards, Report of a WHO Study Group, Technical Report Series 571 (Geneva, Switzerland, 1975), p.72.

7. Olishifski, J., ed., Fundamentals of Industrial Hygiene. (Chicago, National Safety Council, 1979) 2nd ed., p.494.

8. Basalt, Randall C., Biological Monitoring Methods for Industrial Chemicals. (Davis, California: Bio-Medical Publications, 1980) p.2.

9. *Ibid.*, p.2.

10. *Ibid.*, p.2.

11. Freeman, C., The Importance of Pre-employment Physicals. *Occupational Health Nursing*, May 1983, p.35.

12. See, for example, section 66(2) of Regulation 865, under the *Public Hospitals Act*, R.S.O. 1980, c.410, which requires that 'every hospital employee shall be provided with a health review .not earlier than fourteen days before, nor later than fourteen days after commencing his employment.'

13. The Canadian Charter of Rights and Freedoms will also have an impact on the scope of preplacement medical examinations now that the anti-discrimination sections have come into effect.

14. Ontario Human Rights Code, R.S.O. 1981, subsection 9(b).

15. The Hon. Dr. Robert G. Elgie, Minister of Labour. Stated in respect of Bill 7, at Second Reading, May 15, 1982 (Hansard No. 21, p.741).

16. One question relating to both preplacement examinations and periodic health screening that raises perplexing medical, legal and ethical issues is that of the 'hypersusceptible' worker. Among the factors that can contribute, or are assumed to contribute, to individual susceptibility to occupational diseases are: sex and reproductive capacity; familial tendencies to cancer and other diseases; lifestyle factors such as diet, tobacco and alcohol consumption, etc. and sensitivity to certain substances as a result of prior exposure. In addition, recent developments in occupational medicine, epidemiological studies and laboratory procedures have identified factors that may indicate that an individual is either genetically predisposed to specific occupational diseases or may be more sensitive than the average worker to certain hazardous substances in the workplace. Despite the fact that the conclusiveness and predictive value of the medical evidence varies greatly, there is evidence that some employers in the United States have used information concerning an individual's statistical predisposition to occupational disease in making employment decisions regarding hiring. Whether such procedures are currently being conducted in Canada is uncertain. (See: Office of Technology Assessment, U.S. Congress; The Role of Genetic Testing in the Prevention of Occupational Disease, 93, (1983); Genetic Screening, *Labour Occupational Health Program Monitor*, Vol.10, No.4, July 1982, pp.1-2; Rothstein, M.A., Employee Selection based on Susceptibility to Occupational Illness. *Michigan Law Review*, Vol.81, May 1983, p.1492.)

17. Ontario Human Rights Code, R.S.O. 1981, c.340, subsection 16(1).

18. This interpretation is in line with American jurisprudence, which suggests that, in making employment decisions, an employer should focus primarily on the employee's present ability to perform the job in question, and that possible future inability to perform a job does not, in and of itself, justify the refusal to hire or promote a person now. See *Clark* v. *Chicago*, M., St. P. & Pac. R.R., 12 Fair Empl. Prac. Cas. 1102. (Wash. Super. Ct. Oct. 3, 1975.)

19. *Ontario Human Rights Commission* v. *Nel-Gor Castle Nursing Home* O.H.R.C., May 1984, p.74.

20. In the only case under the Code, to date at time of writing, to deal with 'handicap' as a prohibited ground of discrimination *The Ontario Human Rights Commission vs. Nel-Gor Castle Nursing Home et al.*, the complainant was refused employment as a nurses' aide at the respondent's nursing home because it was assumed that a congenital deformity of her left hand would result in her being unable to grasp and lift patients satisfactorily and safely. The board of inquiry held that the respondents had not met the onus of proving that they came within the exception of paragraph 16(1)(b) because they did not put the complainant to the test of a simulated exercise in lifting a patient.

21. Keene, J., *Human Rights in Ontario*. Carswell Co. Ltd., Toronto, 1983, p.80.

22. The use of preplacement medicals might also be challenged under the constructive discrimination provisions contained in section 10, which prohibits the imposition of a

> 'qualification or consideration that is not discrimination on a prohibited ground, but that would result in the exclusion, qualification or preference of a group of persons who are identified by a prohibited ground of discrimination.'

In a section 10 complaint, the probability that a person's right to compete for employment might be qualified by the employer's reliance on a medical report would be held to infringe section 4 unless the employer could prove that the requirement was reasonable and *bona fide* in the circumstances. It is argued that the issue is not whether the respondent acts reasonably in relying on a particular doctor's opinion but whether the examination itself constitutes a reasonable and *bona fide* requirement in the circumstances. In other words, the employer must have imposed the requirement honestly and in good faith, and, in addition, it must be related in an objective sense to the employment concerned.

23. This policy is in line with that established by the Saskatchewan Human Rights Commission, which calls for a two-stage hiring procedure that requires applicants to receive a conditional offer of employment before they undergo a medical examination.

24. Brett, G.Z., 'The Value of Lung Cancer Detection by Six-Monthly Chest Radiographs'. *Thorax*, Vol.23, 1968, p.21. When several British factories were randomly allocated to either provide or not provide chest X-rays to workers every six months over a three-year period, no difference in lung cancer death rates was observed in workers who had taken chest X-rays at the prescribed intervals, when compared to the control group, which had been X-rayed only at the beginning and end of the study. The men who had taken X-rays every six months had their cancers detected earlier, but it was reportedly already too late to save most of them.

25. Sackett, D.L., 'Evaluation of Preventive Health Services'. In: Last, J.M., ed., *Public Health and Preventive Medicine*. 11th ed. (New York: Appleton-Century Crofts, 1980) p.1800.

26. Bombardier, C., McClaran, J., and Sackett, D.L., 'Medical Care Policy Rounds: Periodic Health Examinations'. *Canadian Medical Association Journal*, Vol. 109, 1973, pp.1125-1126. The five-year survival rate is a measurement tool that gives the probability that an individual who has been diagnosed as having cancer will live for a period of five years following the diagnosis. The survival rate is often used to evaluate the effectiveness of particular therapies in the treatment of cancer. The five-year survival period should be calculated from the time at which a clinical diagnosis would usually be made. When screening procedures are utilized, cancers may be diagnosed at earlier stages than would be the case under current medical practice. The interval of time between the early diagnosis made as a result of a screening procedure and the point at which a clinical diagnosis would otherwise have occurred is referred to as the 'lead time'. If the lead time is not taken into account, the five-year survival rate may be inflated simply because the time of diagnosis has moved up and not because the course of the disease has been favourably altered by therapy. Through this type of measurement error, early detection procedures may be perceived incorrectly as having a favourable impact on the progress of the disease.

27. The pre-clinical stage of a tumour commences at the notional point in time when a screening procedure could detect the tumour and continues until such time as an individual would seek medical care on his or her own initiative on the basis of observed signs and symptoms.

28. Feinleib, M. and Zelen, M., 'Some Pitfalls in the Evaluation of Screening Programs'. *Archives of Environmental Health*, Vol. 19, 1969, p.412.

29. American Cancer Society, Inc., 'A.C.S. Report on the Cancer-Related Health Check-Up'. *CA, A Cancer Journal for Clinicians*, Vol.30, No.4, July, August 1980, p.235.

30. World Health Organization, *Mass Health Examinations*, Public Health Papers, No. 45 (Geneva, Switzerland, 1971), pp.81-82.

31. World Health Organization, *Early Detection of Health Impairment in Occupational Exposure to Health Hazards*. Report of a WHO Study Group (Geneva, Switzerland, 1974), pp.27-28.

32. Sensitivity and specificity are the two components that determine the validity of a screening test. Validity may be defined as the frequency with which the result of a test is later confirmed by an acceptable diagnostic procedure. In other words, validity expresses the ability of a test to separate those who have a disease from those who have not. (L.G. Whitby, 'Screening for Disease – Definitions and Criteria'. *Lancet*, Vol.2, 1974, p.820). The sensitivity of a test is its ability to identify correctly those individuals who have the disease (positivity in disease). The specificity of a test is its ability to identify correctly those individuals who do not have the disease (negativity in health).

33. A test that exhibits this attribute should be better able to detect potentially hazardous conditions in the workplace before they produce adverse effects.

34. Multiphasic screening typically includes a medical history, physical examination and a wide range of other investigations, such as X-rays, blood tests and urine tests.

35. Circumstances could, however, exist where different components of a multiphasic screening program could be useful in combination, though not individually. For example, non-specific tests may have particular utility in that they show the integrative effect of exposures to combinations of hazardous agents and stresses (P. Hughes, 'Recent and Potential Advances Applicable to the Protection of Workers' Health'. *International Seminar on the Assessment of Toxic Agents at the Workplace – Roles of Ambient and Biological Monitoring* (Luxembourg, Dec. 8-12, 1980, p.8).

36. The burden of disability may be assessed from the points of view of both the individual and society.

37. This knowledge is considered essentially in developing an appropriate mix of diagnostic and therapeutic services in the face of finite manpower and financial resources.

38. Studies have shown that the simple act of telling individuals that they are suffering from a particular disorder (such as hypertension) is sufficient to produce short-term disadvantages (e.g. decreased psycholog-

ical wellbeing, increased absenteeism and retarded earnings) even though treatment for the disorder is shown to be effective, cf. Taylor, D., *et al.*, 'Long Term Follow-up of Absenteeism Among Working Men Following the Detection and Treatment of Their Hypertension'. *Clinical and Investigative Medicine*, Vol.4, 1981, p.173.

39. With good industrial relations, however, participation results of up to 95 per cent have been achieved.

40. Three Canadian jurisdictions specify that worker consent is a prerequisite for medical testing. These are Saskatchewan, Manitoba and Newfoundland. For example, section 29(1) of the *Saskatchewan Occupational Health and Safety Act* reads:

    > 'The chief occupational medical officer *may*, with the consent of each worker being examined, carry out any medical examination of workers that the chief occupational medical officer considers advisable for the purposes of this Act.' (emphasis added.)

    See also: *Workplace Safety and Health Act*, S.M., 1976, c.63, section 49(1); *Newfoundland Occupational Health and Safety Act*, R.S.N., 1978, c.23, as amended, section 56.

41. *Advisory Council on Occupational Health and Occupational Safety Sixth Annual Report*, p.78.

Acknowledgements

The membership of the current Task Force on the Role of Health Surveillance and Health Screening in Occupational Health Programs includes four members of the advisory council: Dr. J. W. Charters, task force chairman, Dr. E. Kaegi, Mr. H. D. Moyer and Mr. T. O'Connor. Council wishes to thank the non-council members of the task force for their valuable assistance, including Prof. T. Ison, Mr. J. M. More, Mrs. J. Robertson and Dr. D. Sackett. Council also wishes to acknowledge the contribution of past members of the task force, including Dr. J. F. Mustard and Dr. A. D. Wolfson, both former task force chairmen, Dr. E. Mastromatteo and Ms. S. Acheson.

The task force is grateful to Dr. Mastromatteo for his further input into the task force deliberations in his role as chairman of the Federal Task Force on the Health Surveillance of Workers.

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November 14, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
400 University Avenue
15th Floor
Toronto, Ontario
M7A 1T7

Dear ~~Dr. McCalla~~ Dennis:

Thank you for your letter of October 17, 1985, submitting to me Advisory Memorandum 85-II, on the "Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs".

The memorandum is currently under review by my officials and I will forward a final reply to Council's advice in the near future.

Please extend my thanks to Council members for their efforts in the preparation of this memorandum.

Sincerely,

Bill

William Wrye
Minister

Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

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March 6, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Wrye:

It has been council's practice to include its advisory memoranda to the minister in its annual report, thereby making them public at that time if they had not previously been released.

Due to the bearing of council's health surveillance advice on the designated substance regulation process, I believe the early release of Advisory Memorandum 85-II is warranted. If I have not heard back from you within two weeks it would be my intention to make the advisory memorandum available to the public.

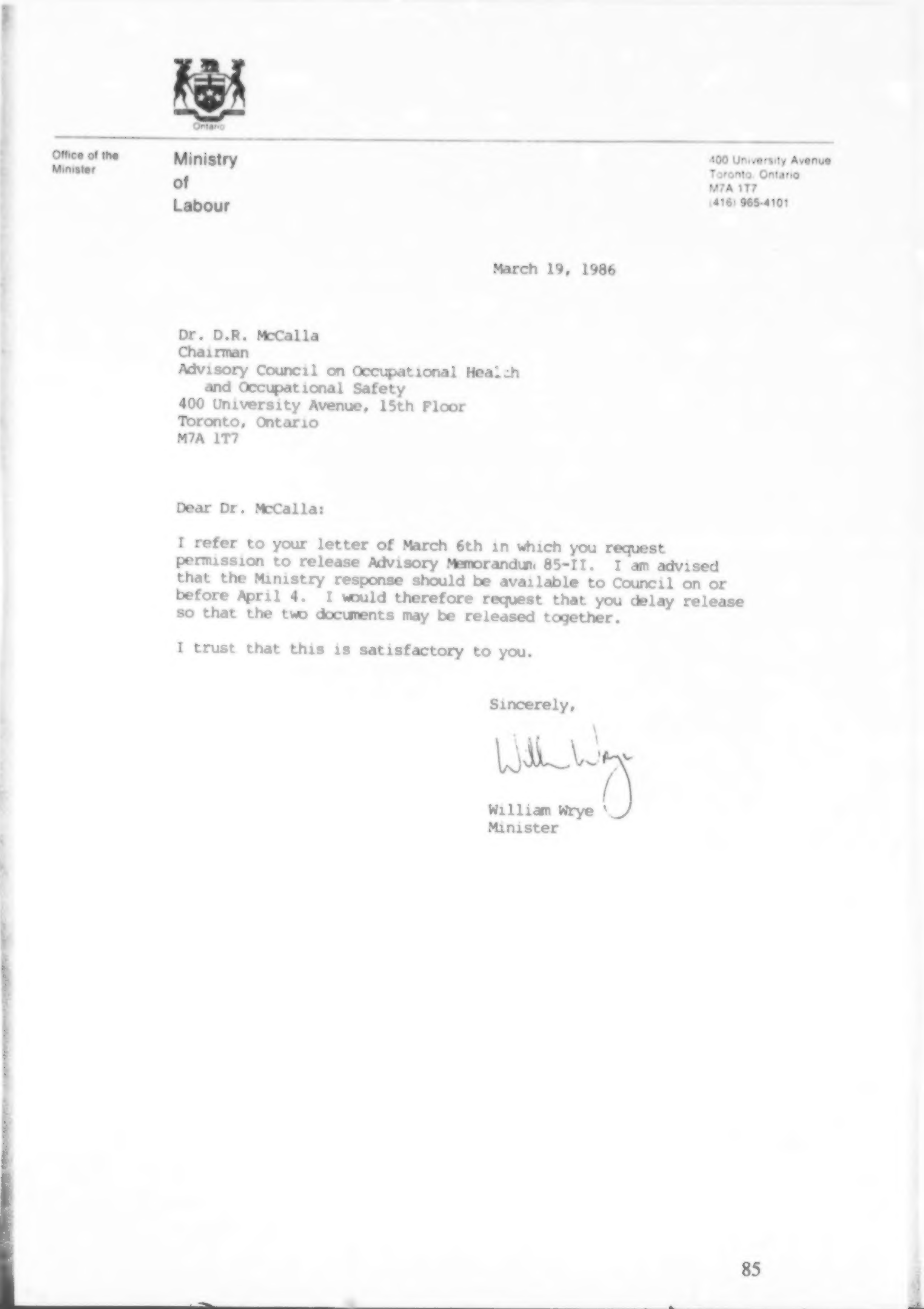
I would be pleased to hear from you regarding this.

Yours truly,

DR McCalla

D. R. McCalla
Chairman

cc to: T. E. Armstrong
Dr. A. E. Robinson
B. Goodman



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March 19, 1986

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I refer to your letter of March 6th in which you request permission to release Advisory Memorandum 85-II. I am advised that the Ministry response should be available to Council on or before April 4. I would therefore request that you delay release so that the two documents may be released together.

I trust that this is satisfactory to you.

Sincerely,

William Wrye
Minister

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April 14, 1986

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health and
Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
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Dear Dr. McCalla:

My officials have completed their review of Advisory Memorandum 85-II, on the Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs, and I am now prepared to respond to Council's advice.

I support Council's view that health screening, health surveillance and biological monitoring procedures should be regarded as complementary to good industrial hygiene procedures and should not be seen as a substitute for proper engineering controls in the work place. Council has correctly pointed out that the selection of procedures for inclusion in work place biomedical surveillance programs should be carried out in a systematic and coordinated fashion. I believe that the classification criteria set out in Advisory Memorandum 85-II will be of considerable assistance in the evaluation of biomedical surveillance procedures.

The response of staff of the Occupational Health and Safety Division, to the recommendations of Advisory Memorandum 85-II, is as follows:

Recommendation 85-6

> "That the Minister of Labour, in consultation with the Ontario Human Rights Commission, take the necessary steps to ensure that preplacement medical examinations are not conducted until after a job applicant has received a conditional offer of employment."

Ministry staff agree with the approach advocated in this recommendation. Members of the Occupational Health and Safety Division are in contact with the Ontario Human Rights Commission, on an ongoing basis, to ensure that the requirements of occupational health and safety legislation are consistent with the requirements of the Ontario Human Rights Code.

The Ontario Human Rights Commission approved a new policy in relation to pre-employment medical examinations, on January 21, 1986. One feature of the new policy is that pre-employment medical examinations will be considered "reasonable and bona fide" only if conducted after a written offer of employment has been extended.

Future regulations will conform with the Commission's new policy on pre-employment medical examinations and the Ministry of Labour will ensure that where pre-employment medical examinations are required under existing regulations, employers are aware that these examinations are not to be conducted until after a written offer of employment has been extended.

Recommendation 85-7

> "That the Minister of Labour appoint an advisory committee of independent medical and scientific experts under subsection 11(1) of the Occupational Health and Safety Act to classify, according to the criteria set out in this memorandum, the biomedical surveillance procedures contained in the medical codes of current Designated Substance Regulations, including those to be set out in the medical codes of any future regulations regarding the control of hazardous substances in the workplace."

The recommendation has considerable merit in that it would lead to a more systematic and rigorous evaluation of mandatory work place biomedical surveillance procedures than has previously existed. However, as Council is aware, the Ministry is already considering alternate approaches to medical surveillance requirements in designated substance regulations. The Health Studies Service of the Ministry of Labour, whose mandate is to provide advice and make recommendations in relation to biomedical surveillance procedures to be incorporated in designated substance regulations, is reviewing the classification criteria suggested by Council with a view to applying the criteria to procedures to be set out in the medical codes of future regulations. Consideration will be given to a re-evaluation of the biomedical surveillance procedures in existing designated substance regulations, using the classification criteria suggested by Council; however, I am sure that Council appreciates the complexity of such a re-evaluation, given that many employers have already established medical surveillance programs to meet the requirements of the existing regulations.

Finally, I am not certain that the evaluation and classification of biomedical surveillance procedures need to be carried out by an advisory body of independent medical and scientific experts, as opposed to experts within the Ministry of Labour, especially since, as indicated in the response to Recommendation 85-8, any in-house evaluation would be subject to public scrutiny; however, I will give due consideration to Council's advice.

Recommendation 85-8

> "That the Minister of Labour take the necessary steps to ensure that the advisory committee's advice to him is circulated to interested and affected parties prior to his making a decision concerning the classification of any biomedical surveillance procedures set out in the medical codes of current or future regulations for the control of hazardous substances in the workplace."

The existing process for the development of designated substance regulations already allows ample opportunity for interested and affected parties to comment on biomedical surveillance procedures, both at the Notice stage and following publication of the proposed regulation. The regulatory development process would provide for discussions on whether biomedical surveillance procedures should be mandatory or not, and where there is a code for medical surveillance, whether the procedures set out in the code are relevant. The process also allows for revisions to the proposed regulation and codes.

I believe that the circulation of information or advice in relation to biomedical surveillance procedures, prior to any decision-making in respect of the procedures to be incorporated in a medical code to a regulation, will introduce an unnecessary and time-consuming step into a regulatory process that has already been criticized for being too long.

Recommendation 85-9

> "That the Minister of Labour, if he chooses not to accept the advice of the independent committee of experts, set out in writing, and make public, his reasons for not doing so."

It is accepted that all factors considered in any decision with respect to the classification of biomedical surveillance procedures, should be publicly and fully disclosed.

Recommendation 85-10

> "That the Minister of Labour take the necessary steps to ensure that workers undergoing health surveillance, health screening and biological monitoring procedures, whether these procedures are mandated or not, are fully informed as to the nature and effect of the procedure, the risks involved and the availability, if any, of a feasible alternative."

Ministry staff support the recommendation. The responsibility to so inform the worker should rest with the examining physician, and indeed, the code of ethics for the medical profession calls for practitioners to explain to their patients the nature of health surveillance procedures, the risks involved and the availability of any alternative procedures.

Consideration will be given to incorporating in the Code for Medical Surveillance in existing and future regulations a requirement that the examining physician inform the worker of the nature of biomedical surveillance procedures, the risks involved and the availability of any alternative procedures. In addition, I am advised by my officials that the College of Physicians and Surgeons will be asked to comment on this issue.

Recommendation 85-11

> "That the Minister of Labour take the necessary steps to ensure that no health surveillance, health screening or biological monitoring procedure be mandated without the employment consequences to the worker of non-compliance being clearly specified."

Ministry staff agree in principle with Recommendation 85-11, but feel that implementation may be difficult. For example, I am sure that Council recognizes the problems that might ensue if the employment consequences of worker non-compliance with a mandatory biomedical surveillance procedure were specified in a regulation; that is, if suspension, or dismissal, for example, were so specified. Such an approach by the Ministry of Labour might be regarded as an invitation to employers to suspend or dismiss workers for non-compliance with a mandatory biomedical surveillance procedure. At present, the issue of how best to implement Recommendation 85-11 remains under consideration.

It would have been helpful if Council had also discussed the very important issue of employer liability if a worker's health is impaired under circumstances where the worker refused to undergo reasonable biological monitoring procedures. The employer is charged with protecting the worker's health. If such protection is generally agreed to include the monitoring of blood levels of a toxicant, such as in the case of lead-exposed workers, and a worker refuses to undergo blood testing and subsequently suffers from lead intoxication, I would be interested to know Council's views as to what the approach of the Workers' Compensation Board and the Ministry of Labour should be, towards the employer (assuming that all other reasonable precautions to protect health were taken).

Again, my thanks to you and your colleagues for the work involved in the preparation of this Advisory Memorandum.

Sincerely,

William Wrye

William Wrye
Minister

Advisory Memorandum 85-III

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August 23, 1985

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
15th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I am writing to request Council's early consideration of the attached Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations. As you are aware, this regulation is the first of the designated substance regulations for the construction industry. It has been developed in close consultation with labour and management in the construction industry. The control by procedures approach in this regulation is a prototype of the other regulations for the industry currently being developed.

Let me review the background of the present regulation. The initial construction asbestos regulation was published in The Ontario Gazette in August, 1982. A public meeting was held in January, 1983. Following receipt of the Report of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario in the spring of 1984, a revised proposed regulation was published in The Ontario Gazette in November, 1984. The revised regulation incorporated some twenty (20) Commission recommendations, many of which were directed at the control of asbestos in buildings and repair operations, which the Commission recommended be covered in the construction regulation. Another public meeting was held in December, 1984 and subsequently, the Ministry received 45 briefs. Following detailed consultations with the affected parties, the attached regulation was approved by legislative counsel for the Government of Ontario.

I appreciate the fact that Council usually devotes considerable effort in comprehensively examining all aspects of the proposed designated substance regulations. However, in view of the history of this matter, the fact that asbestos has already been designated in all but the construction industry, that no exposure limits are included in this regulation, and that the parties have been closely involved in the development of this regulation and support it, I request that Council consider this matter at its next meeting and advise me if there are any matters which I should consider before proceeding to Cabinet by the end of September.

I look forward to your reply.

Sincerely,

William Wrye
Minister

Attachment

Advisory Council on Occupational Health & Occupational Safety
Conseil consultatif de la santé et de la sécurité au travail
Ontario

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

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October 17, 1985

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario M7A 1T7

Dear Mr. Wrye:

On behalf of the Advisory Council, I am enclosing Advisory Memorandum 85-III in which council has reviewed the process for development of the regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations and Related Codes. As you pointed out in your letter of August 23, this regulation and its process of development differ from previous designated substance regulations. Council appreciates your desire to expedite the process and hopes that the suggestions and recommendations contained in this document will be useful.

Yours sincerely,

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Advisory Memorandum 85-III
to the Minister of Labour
October 17, 1985

A Review by the Advisory Council of the Process Used to Develop a Standard for Asbestos on Construction Projects and in Buildings and Repair Operations and Related Codes

INTRODUCTION

In the past, council has conducted its review of the standard setting process leading to the development of designated substance regulations by focusing on three aspects of the process:

1) the analysis of the background documentation (i.e. whether the ministry assembled, reviewed and analysed the available evidence in a reasonable fashion and whether the conclusions reached were compatible with the evidence;
2) the process (i.e. whether the public was provided with sufficient time, information and opportunity to comment on and participate in the development and content of the regulation); and
3) the application (i.e. whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion).

However, this regulation and its development differ from previous regulations in two major respects: it is the first designated substance regulation for construction and asbestos has already been designated and is the subject of a regulation (570/82) for all but the construction industry.

In his letter of transmittal, received by council on August 30, 1985, the Minister of Labour, the Honourable William Wrye, noted these differences and that '. . . the parties have been closely involved in the development of this regulation and support it .' He requested council's advice on any matters that he should consider before proceeding to cabinet by the end of September 1985.

Owing to these differences and the time limitations, council restricted its review to the process of development and the application of the proposed regulation – including clarity and internal consistency. The previous background documentation was not analysed because:

1) council previously reviewed Regulation 570/82 prior to its promulgation;
2) the construction regulation is based on control-by-procedure compared to engineering controls and exposure limits, and
3) the regulation is largely based on the recommendations of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario.

BACKGROUND

In June 1980 a notice of intent to designate asbestos was published, and in August 1980 a proposed regulation was published in the *Ontario Gazette*. This proposed regulation also applied to construction. Among the briefs submitted in response to the proposed regulation was one from the Construction Safety Association of Ontario (CSAO), which proposed a separate control-by-procedure regulation for the construction industry. Subsequently, a decision was made to exempt construction from the proposed designated substance regulation, which came into force August 14, 1982 as Regulation 570/82.

Also in August 1982 the first draft of the regulation respecting asbestos on construction projects was published. Following a public comment period, a revised version of the proposed regulation was presented at an open review meeting in January 1983. After the open review there were numerous meetings between the ministry officials and interested parties. However, as the report of the Royal Commission on Asbestos was considered imminent, revision of the proposed regulation was delayed until the report was tabled.

Owing to the extensive changes necessitated by incorporating 20 recommendations from the royal commission report and the comments of the affected parties, the proposed regulation, published in November 1984, bore little resemblance to previous drafts. Following an open meeting in December 1984, there was a 2½ month comment period (meetings were held with interested parties and 45 briefs were submitted).

In May 1985 Legislative Counsel made further changes prior to approving a revised proposed regulation.

This revised proposed regulation, dated August 23, 1985, was received by council on August 30. On September 4, 1985, council received an 'Analysis of Comments', which contained a very brief description of the history and development of the regulation and a detailed analysis of the comments received and the reasons for changes (or not) to the November proposed regulation. On September 19 council received an amended version of the revised proposed August regulation.

Following a review of the proposed regulation and the 'Analysis of Comments', members of council's task force met with ministry officials to discuss several issues. The agenda for the meeting and a summary of the responses are reproduced as Appendices I and II respectively.

PROCESS

Council commends the ministry on the open approach taken to the development of this regulation. Council understands that the convoluted course of development was due to the interplay of many factors, most significantly, the timing of the report of the Royal Commission on Asbestos and its recommendation to include industrial and other sectors in the construction regulation.

The unique opportunity offered by collaboration with the Provincial Labour-Management Health and Safety Committee of the Construction

Safety Association of Ontario is viewed very positively by council.

Council notes the advantages of having affected parties working together to develop regulations and encourages the ministry to pursue this wherever possible.

From the background material it is not entirely clear how much communication occurred regarding the changes made between November 1984 and August 1985; however, it is council's understanding that communication did occur. Council considers it important that the changes and reasons for the changes made by Legislative Counsel be clearly communicated to affected parties.

APPLICATION

In council's review of the proposed regulation and the Analysis of Comments, two major issues and a few minor issues were identified as causing concern. Task force members sought clarification on the main issues at a meeting with ministry personnel on October 7. (See Appendices I and II.)

1. Section 2(2)

In response to comments, this section had been amended to exempt workers of an employer who has already put into effect and maintained an asbestos control program under Regulation 570/82 when the workers are maintaining, repairing or altering machinery, equipment, vehicles, etc. However, these same workers are *not* exempt when they are maintaining, repairing or altering the building. Reviewing this amendment, task force members sought clarification from the ministry of:

a) whether or not this was the intent of the amendments to the regulation;
b) whether or not this was made clear to the parties requesting the amendments;
c) how this distinction would be made for services to the plant.

During discussion with the ministry on this issue (see Appendix II), the following points were made:

- the distinction was clearly outlined, that is, the exemption from the regulation was restricted to the repair, alteration and maintenance of machinery, equipment and vehicles . . . related to the process operations of the industry as distinct from machinery, equipment, etc. that is part of the physical plant of the building and included in the construction regulation;
- the reasons for not exempting repair, alteration or maintenance of a building were cited as:
  - the advantages of having a report identifying the location of asbestos in the building;
  - the added requirements for notification of workers or others in close proximity;
  - the added precautions required to contain the friable material;
  - the specification of procedures to protect workers from unpredictable exposures to asbestos.

Task force members cited the:

- administrative difficulties of industrial employers in having workers covered by two different separate regulations, perhaps on the same job.

There was a discussion of the feasibility and practicality of allowing for exemption to services to, and access to, the machinery, equipment, etc., described in section 2(1)(e).

In light of these points, council recommends:

ACOHOS RECOMMENDATION 85-12

> that the Minister of Labour give consideration to amending the regulation for Asbestos on Construction Projects and in Buildings and Repair Operations to allow for exemption of maintenance, repair and custodial work on buildings when it is necessitated in gaining access to, or repairing, altering or maintaining services to the equipment, machinery, etc. referred to in section 2(1)(e) when this work is carried out by workers employed by an employer who has put into effect and maintained measures and procedures to control the exposure of such workers to asbestos and has incorporated the same in an asbestos control program in accordance with Ontario Regulation 570/82.

As a means of allowing for such exemption, council suggests giving consideration to inserting the following phrase in section 2(1)(e): '. . . vehicles, *and services and access to services thereto, . . .*'

The administrative difficulties and potential overlap of programs for industrial establishments were a concern to affected parties during the process, and they remain a concern to council.

2. **Section 7(6)**

Appendix I outlines council's concern with this subsection. Council recognizes the ministry's intent to follow Recommendation 10.9 of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario and acknowledges the rationale for the amendment in the revised regulation. In discussion with ministry personnel (see Appendix II), it was further clarified that other legal options had been explored by the ministry but rejected due to:

a) the lack of provision in the Act to impose civil liability,
b) the lack of precedent, in analogous situations, for interfering with private contracts, and
c) the fact that the regulation clearly identifies the responsibilities of each party. Hence, if any party has not fulfilled his/her responsibility there are adequate grounds for prosecution and legal suits in a civil court.

Council acknowledges these points but still fears that without some form of provision for liability for contravening section 7(1)(a) or providing incorrect information in the report referred to in section 7(1)(b), such contraventions would not be adequately discouraged.

However, council also recognizes the potential for abuse if special legislation were passed that would provide for contracts to be opened for renegotiation, and cautions that any such provisions should be restricted to the case of asbestos or, at most, unexpected discovery of designated substances.

Considering the ministry's awareness of the potential problems, the potential abuses and the difficulties involved in imposing liability for the extra costs incurred from the unexpected discovery of asbestos, council suggests that the implementation of the regulation should not be delayed while searching for a solution to this issue. In the meantime, council recommends:

ACOHOS RECOMMENDATION 85-13

that the Minister of Labour ensure that compliance and/or abuses of section 7 are closely monitored, the outcome of disputes are periodically assessed and the search for legal alternatives for ensuring compliance with the regulation continues.

Another point for clarification on section 7(6) sought in the meeting with the ministry was: What happens if a report is not made under section 7(1)(b) and asbestos is discovered? It would appear from the wording of section 7(6) that this subsection would not apply.

ACOHOS RECOMMENDATION 85-14

that the Minister of Labour give consideration to amending section 7(6) by adding a phrase to include situations where a report *should have been prepared in conformity with section 7(1)(b). . . .*

3. Organization of the Regulation

Another issue that caused council concern was the organization of the regulation. Specific points that were noted are set out below along with suggested remedies.

a) *Section 8(1)* refers to notification of a Type 3 operation prior to, and without reference to, the definition of a Type 3 operation which is in section 9. This caused concern because

- it leads to confusion about what a Type 3 operation is, and
- it could be overlooked as it is removed from the procedures required for Type 3 operations (sections 12 and 14).

Council understands that, as section 8 is a requirement for notification prior to commencing work, it should be with other notifications. Council suggests two amendments to avoid confusion and to ensure that the section is not overlooked:

- that section 8(1) include a reference to the definition of Type 3 operations in section 9(1)(c); and
- that a phrase be added to section 14 referring to section 8 and the requirement for notification of Type 3 operations.

b) *Section 11(4)(i)* refers to 'a container as described in paragraph 3 of section 12.' Council suggests that the description of the container should accompany the first reference to it and that subsequent mention refer to the section where the container was first described.

c) *Sections 14(5)(vii) and 14(6)(v)*
Council raised with the ministry the issue of whether it was the intent of these clauses that '. . . a worker . . . shall, in the following order . . . (C) shower, and (D) remove and clean the respirator.' It was confirmed that the intent of the regulation was that workers should not remove their respirators until they are within the shower area, and the respirator can be rinsed off. Council acknowledges the rationale for this provision and suggests that this should be explained in a guide to the regulation.

d) *Sections 11-14*
Council found it confusing that section 11 specifies procedures for Type 1 operations, section 12 specifies procedures common to Types 2 and 3 while section 13 specifies procedures for Type 2, and section 14 specifies procedures for Type 3. However, council recognizes that the overlap in procedures for Type 1 and Types 2 and 3 is minimal and understands the origin of this approach and the process of its development.

Council recognized that a number of the points noted may have arisen out of the complicated process leading to the develop-ment of this proposed regulation. Council also recognizes the delicate balances achieved during tripartite negotiations and does not suggest that any organizational changes be made to the regulation. Council understands that the ministry is developing a guide to the use of the regulation and council believes a guide is essential. Council feels that this guide should give a detailed description of the regulation and the rationales for the various sections; it should include a flow diagram indicating the responsibilities and duties of the various parties and, in a tabulated format, a list of all the classes of operations according to type and subtype together with the procedures that are required for each operation. The types of operations, the procedures required and the responsibilities should reference the relevant section/subsection of the regulation. Council points out that if the responsibilities and duties are clearly identified and understood, many of the concerns regarding section 7(6) and potential violations of section 7(1)(b) (discussed earlier) would be alleviated. Every effort should be made to make the guide available by as close as possible to the time the regulation is filed with the Registrar of Regulations.

Other minor points that were noted in council's review are described in Appendices I and II.

4. Section 9(2)

The issue of whether or not a time limit should be specified for the resolution of the dispute referred to in section 9(2) was discussed with ministry personnel (see appendices).

Ministry personnel pointed out that, although possible under the Act, such time limits are not commonly specified as they pose considerable administrative difficulties. However, it was acknowledged that such decisions should be made as soon as possible.

Council considers it important that such disputes should not disrupt work longer than necessary.

In summary, council commends the ministry on both the process of development of this regulation and the comprehensive nature of its application. Council recognizes that this regulation, being the first in a series of regulations to be developed for the construction industry, may not be perfect, however, council believes that its implementation should go a long way towards helping to protect the health of workers and individuals in close proximity to work that is likely to cause exposure to asbestos.

Council recognizes that many, if not all, of the issues discussed with ministry personnel and in this advisory memorandum have been considered and discussed by the ministry and affected parties and that the resulting regulation and its organization are the result of negotiations and the subsequent balancing of proposed solutions. For this reason, the only changes council has advocated for consideration are minor, and council urges the minister to proceed with this long anticipated regulation for asbestos in construction. Assessment of its application and the disputes that arise should provide the ministry with valuable information on the need for amendments to the regulation (and possibly the Act) as well as aid ministry personnel to develop further control-by-procedure regulations for construction. Council stresses the need for a comprehensive guide to the use of the regulation. The guide should be available as near as possible to the publication of the regulation and should clearly specify the responsibilities and duties of the various parties, the classification of operations and procedures required and their rationales. It should contain cross references to the regulation throughout and a comprehensive index.

APPENDIX I

Issues for Discussion With Ministry Personnel at the October 7, 1985 Meeting

Following the task force's review of the proposed regulation, two major issues were identified as needing clarification:

Section 2(2)

In response to the proposed regulation (November 1984) there were many comments regarding the application of the regulation to repair or maintenance in an industrial or mining establishment. In the 'Analysis of Comments' received by the advisory council, it is stated 'Section 2 of the revised regulation now states that the regulation does not apply to maintenance and repair work being carried out by workers of an employer to whom Regulation 570/82 applies if that employer has put an asbestos control program into effect on or before the date the revised regulation is filed' (page 9). '. . . the regulation will not apply when these (industrial maintenance) operations are carried out by workers of an employer who has developed an asbestos control program under Ontario Regulation 570/82' (page 18).

However, the amendments to both the proposed Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations and Regulation 570/82 clearly specify that the exemption is only for repair and maintenance of machinery, equipment, aircraft, ships, locomotives or vehicles, but not on repair, maintenance and custodial work on buildings.

In the 'Analysis of Comments' (pages 9 and 18), this distinction is not clear, and the task force wonders 1) whether this distinction was understood by the affected parties, and 2) what the reasons are for this distinction and how the distinction will be made and administered when the work is carried out by the same workers on the same project.

Section 7(6)

Recommendation 10.9 of the Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario stated that '. . . if, in the course of the work, friable asbestos-containing materials of which the contractor was not informed are discovered in locations which could create some risk to workers, adequate precautions for worker protection should be taken, at the sole expense of the building owner.'

Section 6(6) of the proposed regulation (November 1984) covered the situation where there was not proper notification and asbestos was discovered during the work; liability for carrying out the work as prescribed was assigned to whomever failed to notify as required — the owner, constructor or employer, as the case may be.

Council recognizes the ministry's intent and read with interest the rationale for the amendment to the regulation (page 20 of 'Analysis of Comments'). As this issue is of such fundamental importance to all parties involved, the task force wonders

1) whether the Legislative Counsel's opinion is consistent with past interpretations of the Act;
2) what other mechanisms are available to the minister to incorporate this liability clause into the regulation, e.g. an amendment to the Act or the passage of supplementary or enabling legislation.

The task force also requests clarification of the following minor points:

Section 9(2)

The task force wonders whether it is within the powers of the Act to specify a time limit for the resolution of the dispute referred to in section 9(2).

Sections 14(5)(vii) and 14(6)(v)

Does the regulation really mean 'in the following order', '. . . (C) shower, and (D) remove and clean the respirator'?

Sections 14(6)(x) and 15(l)

Who would be deemed to be competent for the purposes of these subsections?

Section 17

Who is the Chief Physician?

Most of the other issues identified by the task force's review pertain to the organization of the draft regulation.

APPENDIX II

Asbestos on Construction Projects and in Buildings and Repair Operations – Summary of the Responses to, and Discussion Resulting From, the October 7, 1985 Meeting With Ministry Officials

Section 2

Ministry personnel confirmed that the exemption from the Construction Regulation was restricted to the repair, alteration or maintenance of machinery, equipment, etc., used in process operations involving asbestos if the employer has, on or before the day the regulation is filed with the Registrar of Regulations, put into effect and maintained a control program under Ontario Regulation 570/82.

In discussion with task force members it was pointed out that the asbestos in buildings can be broadly classified into three categories:

1) On or in the basic structure of the building;
2) On or in machinery, equipment and vehicles;
3) On or around services.

Under the conditions specified in section 2(2), workers handling asbestos in Category 2 would be exempt.

Task force members stressed the difficulties of administering two regulations requiring different training, record keeping and medical programs for the same workers on the same job.

Ministry personnel acknowledged the difficulties such a distinction would cause to some large industrial companies, but cited the advantages of the construction regulation and the rationale for making it the dominant regulation, e.g.:

- the requirement for a detailed record of the location of asbestos;
- the added protection of control-by-procedure to workers exposed to sporadic, unpredictable levels of asbestos;
- a central registry of workers with irregular exposures;
- the precautions required to protect and inform others in close proximity to work involving asbestos.

There was a lengthy discussion about the possibility of including in the exemption [cited in section 2(1)(e)] the repair, maintenance or alteration of services, and access to the services and to the process equipment, machinery, etc. It was suggested that a definition of services include electrical, mechanical and utilities, and it was clarified that work on services in non-process related buildings would not be included in such an exemption.

Section 7(6)

The discussion relating to this subsection clarified that the ministry had attempted to include the provision for an owner to be liable for the extra costs of precautions required when asbestos was unexpectedly discovered on a job in progress. In response to Legislative Counsel's opinion, ministry personnel had reviewed other alternatives, such as amending the Act. However, the implications of such action extend beyond the case of unexpected asbestos discovery, beyond health and safety and into the realm of the role of government in private contractual agreements.

It was pointed out that a careful review of the legislation and the implications of such amendments is required.

Task force members stressed the importance of this issue and the need for the regulation to clearly specify the responsibilities and duties of the parties and the penalties for violating the provisions of the regulation. The case of Section 7(6) was of particular concern, as without liability being specified, task force members believed that owners would be more likely to avoid reporting the presence of asbestos. The implications to contractors and the health and safety of workers was considered so significant that action is warranted.

Ministry personnel pointed out that if an owner failed to report the presence of asbestos, he or she would be violating the regulation and be liable for prosecution, and the contractor would have adequate grounds to sue the owner – in a civil court for the extra costs incurred. In addition, they noted that even with the proposed obligation, the remedy would still be in civil court.

Task force members did not consider that the civil court was the preferred means of dealing with a problem that could affect the health and safety of the workers.

Task force members also pointed out that the wording of section 7(6) implies that it applies only when a report has been prepared. Ministry personnel stressed that the intent of the regulation was that, except for section 7(5), a report is always required and section 7(6) would apply.

It was agreed that a minor amendment to this subsection should be made to clarify this issue and that explanatory notes should clearly specify the responsibilities and duties of the various parties.

Section 9(2)

The issue of specifying a time limit for the resolution of a dispute was discussed. It was confirmed that, in the past, it has not been the practice to specify a limit. However, it was acknowledged that the inspectors' decisions should be made as soon as possible.

Sections 14(5)(vii) and 14(6)(v)

Ministry personnel clarified that the intent of these sub-sections is that workers should not remove their respirators until they were in the shower area (the first 'clean' area away from the work area) and that the respirators should be rinsed under the shower so the respirator could enter the 'clean area'. There was a discussion about the reasons for this order, the practicality of the requirement and the likelihood of its occurrence.

Sections 14(6)(x) and 15(1)

Ministry personnel explained that the definition of 'competent' in the Act applies to the regulation, i.e. 'competent person' means a person who –

i) is qualified because of his knowledge, training and experience to organize the work and its performance,
ii) is familiar with the provisions of this Act and the regulations that apply to the work, and
iii) has knowledge of any potential or actual danger to health or safety in the workplace.

Section 17

Ministry personnel confirmed that Dr. Peter Pelmear is the Chief Physician referred to in this section.

Ontario

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November 26, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
15th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of October 17, 1985 forwarding a copy of Advisory Memorandum 85-III containing Council's review of the development process for the Regulation respecting Asbestos on Construction Projects and in Buildings and Repair Operations. I appreciate the efforts made by Council to complete its review in a timely fashion.

I have noted Council's concern that the changes and the reasons for the changes made to the regulation since November, 1984 have not yet been clearly communicated to all affected parties. Prior to filing this regulation, I will write to those who participated in its development advising of the changes and the rationale. The rationale will be based on the "Analysis of Comments", which was reviewed by Council and which explains the changes made to the November proposed regulation.

A major issue identified by Council is the exemption from the regulation, of employers and their workers who are carrying out repair, alteration and maintenance work on machinery and equipment, where the employer has developed and put in place an asbestos control program in accordance with O. Reg. 570/82. Council has commented that such work might entail some alteration (and subsequent repair) to the building housing the machinery and equipment in order that access might be gained to the equipment or to services to the equipment. This could result in a situation in which the two asbestos regulations would apply to the same job. To avoid this problem, Council has recommended that the exemption be extended to maintenance, repair and custodial work on buildings, when such work is required in gaining access to, or repairing, altering or maintaining services to the equipment and machinery.

Council's point is well taken, and clause 2(1)(e) has been appropriately amended.

The second major issue identified by Council is the question of liability when a contractor unexpectedly discovers asbestos in the course of a job. In the November, 1984 draft of the regulation, liability for carrying out the work as prescribed by the regulation was attached to whomever failed to notify as required, the owner, constructor, or employer, as the case may be. However, legislative counsel subsequently advised that this provision was not within the regulation making powers spelled out in the Act, and it was accordingly removed from the regulation.

Council is concerned that without some form of provision for liability for contravening the requirement to notify of the presence of asbestos, such contraventions would not be adequately discouraged. But Council has also urged caution in considering special legislation that would provide for contracts to be opened for renegotiation. In short, Council recognizes the dilemma faced by the Ministry on this issue. Nevertheless, Council has suggested that implementation of the regulation should not be delayed while searching for a solution to this issue. I fully agree with Council's suggestion in this regard.

Council has also recommended that compliance with section 7 be closely monitored, the outcome of disputes be periodically assessed, and the search for legal alternatives for ensuring compliance be continued. Again, I fully agree with Council's recommendation.

Council has also pointed out that if asbestos was discovered on a job and a report had not been prepared, then subsection 7(6), which requires work to stop, would not apply. I concur with Council that subsection 7(6) should apply in such a case and the regulation has been appropriately amended.

Another cause of concern to Council was the organization of the regulation. There can be little argument that the regulation is complex. Council has suggested several small changes to reduce confusion or misreading of the regulation. I am mindful of Council's concern and have directed that the office consolidation be annotated. This will help the reader and obviate the need for the changes suggested by Council.

Council has also emphasized the importance of a guide to the regulation as a means of furthering understanding of its provisions. I share Council's view that the guide will be an important element for the successful implementation of the regulation. The highest priority will therefore be given to making the guide available at the time the regulation comes into force. Council's suggestions concerning the contents of the guide are most helpful and, I can assure you, my officials will make every effort to incorporate them into the guide.

The final issue raised in Council's Memorandum was whether or not a time limit should be specified for the resolution of disputes. Since disputes may vary from the simple to the complex and technical, depending on the matters in issue, I do not believe it desirable and appropriate to specify a time limit. My officials have been reminded that decisions on disputes are to be made expeditiously, taking into account the particular issues raised during the course of an investigation.

Finally, I would like, once again, to thank Council for its advice. The development of this regulation has been a long and arduous process. Council's efforts to facilitate the process in its final stages are therefore greatly appreciated. I share with Council the hope that the lessons learned in the development of this regulation may soon be applied to other control-by-procedure regulations for the construction industry.

Sincerely,

William Wrye
Minister

Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

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March 25, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Minister:

On January 28, 1986, Mr. Quesnel, Chairman of the Provincial Labour-Management Health and Safety Committee of the Construction Safety Association Ontario, forwarded to council a copy of his letter to you dated December 18, 1985. He explained the committee's concerns with the Asbestos on Construction Regulation. The most serious item was the acceptance of single-use dust respirators for non-powered air purifying respirator applications.

It appears as though the committee's concern about this item is two-fold:

1) The technical difficulty of testing and maintaining an effective fit for the single-use respirators and hence, the likelihood of exposing workers to hazardous substances even though they may be wearing a respirator. In the case of asbestos, which is a carcinogen, exposure of workers who may think that they are adequately protected is a serious issue.

2) The process which led to the acceptance, in regulation, of single-use respirators. It appears as though the committee was not informed of the change that occurred after the extensive consultation which the ministry personnel had with the committee during the development of the regulation.

Council understands that ministry personnel are aware of the problems associated with the use of single-use respirators and are alerted to the importance of having an effective seal between the respirator and the worker's face.

With respect to the issue of the process leading to the change, council has previously stressed the importance of informing affected parties about changes made after consultation with the affected parties:

- ACOHOS Recommendation 84-5 from Advisory Memorandum 84-I - 'That, if substantive changes are to be made at a late stage, the minister ensure that all interested parties be given an opportunity to comment.'

...2

Further, in Advisory Memorandum 85-III, council noted that 'From the background material it is not entirely clear how much communication occurred regarding the changes made between November 1984 and August 1985; however, it is council's understanding that communication did occur. Council considers it important that the changes and reasons for the changes made by Legislative Counsel be clearly communicated to affected parties.'

As stated in Advisory Memorandum 85-III, council views the collaboration with the Provincial Committee of the Construction Safety Association of Ontario very positively, and noted the advantages of having affected parties working together to develop regulations. Hence, the breakdown in communication at a critical stage of developing this regulation is unfortunate. Council hopes that it will not be viewed by the parties involved as a barrier to further such collaborative endeavours.

Council notes that the concern of the Provincial Committee appears unanswered and unresolved and hopes that this situation can be rectified.

Yours truly,

DRMcCalla

D. R. McCalla

cc: Mr. M. Quesnel

Advisory Memorandum 85-IV

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Office of the
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February 3, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Minister:

On behalf of the Advisory Council, I am pleased to submit Advisory Memorandum 85-IV. This paper deals with the issue of workplace control programs.

Council understands that some of the components of a workplace control program are presently being considered under the proposed 'Right to Know' regulation and stresses the importance of incorporating these provisions into a comprehensive program aimed at protecting workers from adverse effects of hazardous conditions, substances and agents in the workplace.

We hope that the advice included herewith is of use to you.

Yours truly,

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong
Dr. A. E. Robinson
B. Goodman

Advisory Memorandum 85-IV
to the Minister of Labour
January 31, 1986

Workplace Control Programs

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SUMMARY

The control of hazards in the workplace is fundamental to occupational health and safety. The Occupational Health and Safety Act and numerous regulations under the Act are directed to this objective. During a review of the current measures, the legislative requirements and the provisions for the control of hazardous substances and agents in the workplace, council recognized the need for general workplace control programs. Such programs should provide the framework for all control programs needed and/or required and would aid employers and workers in meeting the obligations of the general duty clause – to protect a worker from hazards in the workplace.

This advisory memorandum recommends that all workplaces be required to have a workplace control program to identify and control the hazards at each workplace. Recognizing the variety of workplaces and the complexity of implementing such programs, council recommends that the programs be flexible and performance oriented.

Two levels of program are identified:

Level 1: a basic program consisting of several essential components, which should be required for all workplaces;

Level 2: a more comprehensive program required for workplaces in which the implementation of a Level 1 program has identified substances or conditions that pose a risk to the health of a worker. A number of essential components are identified for Level 2 programs.

Two suggestions are made to aid in the administration and implementation of workplace control programs: 1) that the requirement for the programs be phased in, commencing with the 'high risk' industries, and 2) that a work book be developed to aid employers and joint health and safety committees to design, develop and maintain a program. Several suggestions are made for the style, format and content of the work book, i.e. it could, when filled out and co-signed by labour and management, fulfil the requirement for a written workplace control program.

BACKGROUND

In May 1984 council established the Task Force on Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace. In partial fulfilment of its terms of reference, the task force produced a report, which council submitted to the minister as Advisory Memorandum 85-I. The third term of reference of the task force was:

> to review current measures for the control of hazardous substances and agents in the workplace and to consider alternative approaches, including possible modifications of the current model of designated substance regulation.

There is provision in the legislation for a wide variety of control and/or regulatory actions; however, in its review, the task force identified the need for guidance on meeting the obligations of the legislation, especially the general duty clause 'to take every precaution reasonable in the circumstances for the protection of the worker.' This advisory memorandum represents council's advice on this issue.

The definitions used in this advisory memorandum are the same as those used in Advisory Memorandum 85-I and are appended (Appendix I).

Review of Current Measures for Control of Hazardous Substances and Agents in the Workplace

Appendix II contains a brief review of programs in the United States for providing information on hazardous substances in the workplace as well as the Workplace Hazardous Materials Information System (WHMIS) proposed for Canada and workplace program requirements in Quebec. These systems are cited as initiatives that are relevant to the Ontario Ministry of Labour's decisions on implementing workplace control programs.

Provisions Under the Occupational Health and Safety Act (Ontario)

Under the Act there are a number of general provisions for protecting the worker [s.14(2)g], acquainting a worker with any hazard in the workplace and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent [s.14(2)c]. In section 15 there are provisions for:

- establishing an occupational health service;
- keeping and maintaining accurate records of handling, storage, use and disposal of biological, chemical and physical agents;
- keeping and maintaining and making available to workers records of exposure of a worker to biological, chemical or physical agents;
- monitoring levels of such agents;
- complying with standards limiting exposures;
- providing written instructions of precautions to workers *as prescribed.*

Under section 20 the director can prohibit, limit or require certain controls for the use of substances in a specific workplace if, in the director's opinion, the substances are likely to endanger the health of a worker. The orders issued by a director under this section apply only to a specified workplace, thus do not automatically provide industry-wide control.

Under the Act inspectors can inspect any workplace at any time [s.28(1)], and if an inspector finds that a provision of the Act or a regulation is being contravened, he may issue an order [s.29(1)]. If he finds that the contravention is a danger or hazard to the health or safety of a worker, he may order that work stop until there is compliance with the order [s.29(4)].

Also, under section 41, the lieutenant-governor in council can make regulations:

'respecting the reporting by physicians and others of workers affected by any biological, chemical or physical agents or combination thereof'; [s.41(2)11)];

'regulating or prohibiting atmospheric conditions to which any worker may be exposed in a workplace'; [s.41(1)12];

'prescribing methods, standards or procedures for determining the amount, concentration or level of any atmospheric condition or any biological, chemical or physical agent or combination thereof in a workplace'; [s.41(2)13];

physical agent or combination thereof in a workplace'; [s.41(2)13];

'prescribing any biological, chemical or physical agent or combination thereof as a designated substance'; [s.41(2)14];

'adopting by reference any criteria or guide in relation to the exposure of a worker to any biological, chemical or physical agent or combination thereof'. [s.41(2)17].

Present Practice in Ontario

In Ontario the approach has been to 'designate' substances under section 41(2)14, i.e. regulation/control has been directed at identifying hazards that require control and at specifying exposure limits, control strategies, monitoring techniques and health programs that are legally enforceable but specific for individual substances.

The process the ministry has chosen to use for designating individual substances is laborious and time consuming even when the substance is a well-documented hazard to human health and safety. As the less well-known or less well-tested substances are considered for regulation, there will be the additional problem of whether or not to await sound scientific evidence on which to base the controls. Insufficient scientific evidence raises the question of how the appropriate level of control can be determined. It is of interest to note that after lengthy analyses of the health effects data, economic impact and technical feasibility, the exposure limits in the designated substance regulations have not varied from the American Conference of Government Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) by more than a factor of two.

There are provisions in the Act for enforcement. Directors and inspectors can issue orders for contravention of the Act or regulations. However, there are few guidelines for interpreting the general duty clause [s.14(2)(g) 'to take every precaution reasonable in the circumstances for the protection of a worker'] and orders issued are often appealed. The exposure levels that are used by inspectors as guidelines are not only not as yet prescribed, [as they could be under section 15(1)(g)], but, in many cases, are not known to employers or workers. Some companies have developed and use general workplace control programs that outline a code of practice for handling all substances in the workplace. In many cases these workplace control programs use ACGIH, TLVs or local modifications of TLVs as exposure limits to determine the level of control required.

Council recognizes the value of such workplace control programs as a means of identifying hazardous substances and conditions that need control and, at the same time, forming a framework for all control programs that may be required and/or needed to comply with the general duty clause to protect the health of a worker.

Workplace Control Programs

Council considers that all workplaces should have a general workplace control program. The program should be based on the same three fundamental principles governing any control program:

1) recognize the hazard;
2) evaluate the hazard;
3) control the hazard.

The program will be described according to these three phases.

Phase 1 – Recognize the hazard

In order to recognize hazards in the workplace, it is essential to have information on the substances and conditions present. For this reason, council believes that every workplace should be required to have:

1) an inventory consisting of a list of all the substances and agents used in the workplace.The list could be subject to certain exemptions, such as manufactured articles and substances like food. Recommended exposure limits* should be indicated for each substance, agent or condition deemed to be a potential hazard in the workplace including substances for which exposure limits have been published by agencies such as ACGIH;
2) a Material Safety Data Sheet (MSDS)** for each substance, which must contain information on its chemical and toxic properties and the precautions required for routine handling, cleaning up spills and transportation and emergencies as well as information on first aid treatment and possible adverse health effects.

Phase 2 – Evaluate the hazard

There needs to be a mechanism for evaluating the information provided by the inventory and MSDSs and for assessing the extent of the hazards posed at a specific workplace and the need for specific precautions and/or controls. In its simplest form an assessment should involve reviewing the inventory and the MSDSs for substances, agents or conditions that could pose a hazard; considering the conditions and/or use of substances and agents and the possible extent of exposure compared to the recommended exposure limits.

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* Recommended exposure limits could be ACGIH TLVs, internal guide lines or exposure criteria recommended by the Minister of Labour, whichever is lower.

** The information on the MSDS should include the requirements of WHMIS.

In accordance with the principles of the Act it is important that this process of identifying and evaluating the hazards is done jointly by labour and management. Hence, the information has to be available to all members of the joint health and safety committee or to a worker representative where there is no committee.

Phase 3 – Control the hazard

The stringency of the controls included in a workplace control program should depend on both the specific risk posed by conditions, substances or agents identified in Phase 1 and the extent of the risk determined by the assessment described in Phase 2.

If, at a specific workplace, the conditions, substances and/or agents that are identified as potentially posing a minor or moderate degree of hazard can be controlled by simple precautions and basic hygiene measures, a Level 1 general workplace control program would be sufficient, i.e.:

Level 1 programs should consist of seven basic components:

1) an inventory (as described on page 7);
2) Material Safety Data Sheets (as described on page 7);
3) a means of evaluating the information and assessing the potentially hazardous substances, agents and/or conditions;
4) a code of practice for dealing with all substances and agents in the workplace, and basic first aid instruction;
5) a description of the precautions and hygiene measures required for control of specific hazards;
6) provisions and procedures for dealing with spills; and
7) a means of communicating this information to the workers and of involving the workers in the process of developing, implementing and maintaining the program.

However, if, at a specific workplace, there are conditions, substances and/or agents that are identified as potentially posing a serious hazard or substances/agents/conditions posing a degree of hazard that cannot be controlled by simple means, the workplace should also be required to have a Level 2 program.

Level 2 programs should consist of the components required for Level 1 *and*:

1) a means of controlling hazardous substances, agents or conditions in the workplace to minimize worker exposure. The controls should aim at the source of exposure, e.g. containment or engineering controls;
2) an emergency plan that outlines the procedures and equipment to be used for cleaning up spills, and in cases of emergency, fire, escape, etc.;
3) an exposure measurement program that includes a description of the means that the employer uses or intends to use to monitor and control both the exposures to these substances, agents and conditions and the frequency of the monitoring used to ensure that the control mechanisms maintain the exposures below the recommended limits. Records of exposure measurements should be made, kept and linked to other records (work histories, medical records) as necessary;

4) records of work histories for workers. The work histories should include the tasks performed that involve exposure to hazardous substances and agents; the conditions of use of these substances and agents; the potential for exposure due to the location of work stations being near other areas where hazardous substances are being used; and control mechanisms in place and/or available for use. The work histories should be linked to exposure data for substances that are considered to be a hazard for the various worksites or tasks;
5) a health surveillance program if such a program has been shown to be effective for the specific hazards that are present at the workplace (for criteria and guidance regarding this issue see Advisory Memorandum 85-II);
6) a training and education program for each worker that stresses the substances handled and the specific hazards the worker may encounter, the precautions that should be taken and the controls that are in place and/or available for the worker's use. It should also include a description of the workplace program, how the worker can access it and where he or she can obtain further information. Information on hazardous substances, agents and conditions in a workplace be communicated to any contractors, construction workers, etc. who are likely to come into contact with, or be exposed to, the hazards at the workplace. Basic information required for this training and education should be available on the MSDSs;
7) a mechanism, preferably involving joint health and safety committees, for periodically assessing the adequacy of the control program and for auditing its effectiveness.

Although the components of both Level 1 and Level 2 workplace control programs should be specified, each can be viewed as a performance standard allowing the employer the flexibility to design a program to suit the specific needs of his or her work place and employees.

The workplace program should be developed with the knowledge of, and provision for input from, the joint health and safety committee. It should be committed to writing and include the objectives and principles as well as the means of fulfilling the requirements of the specified components. This written program should be described to the employees as part of their training.

It should be available for review by workers and available to inspectors to aid them in their assessment of the effectiveness of the measures taken to control the hazards at specific workplaces or worksites.

Because council recognizes the difficulties associated with requiring all workplaces, regardless of size, to have a workplace control program, council recommends that a 'work book' be developed to aid employers to design their workplace control programs. The importance of work books is recognized by organizations such as the Industrial Accident Prevention Association (IAPA) and the Ontario Federation of Labour (OFL),who currently use work books to aid workers and employers design programs to enhance workplace health and safety.

The requirement for workplace control programs with certain mandatory components would allow for a standardized approach to developing the program while still allowing flexibility for different sectors and/or individual worksites.

The work book could be used as a guide similar to that prepared by the CSST (the Commission de la santé et de la sécurité du travail) in Quebec (see Appendix II) or as a minimum requirement that, when completed and signed by management and labour, would become the written program in the workplace.

The work book should contain the purpose and the minimum components of the program, and it should describe how these requirements are to be met. It should also encourage the refinement of the program by suggesting activities resources and sources of information. Council considers that the work book should be detailed and easy to follow and should contain a series of questions with ample space and encouragement for expansion.

The advantages of a work book include the following:

- it will facilitate the process of developing workplace control programs, especially for small industries;
- it will minimize the expense and effort of designing workplace control programs for specific workplaces;
- it will minimize uncertainty about the practical interpretation of the legislation;
- it will provide a practical guide to the general duty clause as it relates to dealing with hazardous substances and agents in the workplace (i.e. what is expected by the ministry inspectors);
- it will promote reasonable uniformity across industries;
- it will establish a written record of the program and aid inspectors;
- it will provide the framework for annual assessments by the joint health and safety committee.

Council believes that the role of the ministry should be to: provide leadership; aid employers to design programs to suit their specific needs; help determine whether the programs are adequate to achieve the goal; and monitor workplaces for compliance with the control program. It is recognized that this role is difficult, and that its success will depend largely upon the inspectors' ability to assess individual workplaces, the hazards, the adequacy of the workplace programs and the effectiveness of their application. However, if the programs are well designed, internal auditing by joint health and safety committees should identify areas of concern.

The written program and/or completed work book should be avail able to the ministry* and, when reviewed, it should help to identify areas of concern that may require further intervention.

It should be noted that, if workplace programs are implemented effectively,** they will:

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* The information available to the ministry should be subject to the usual requirements for protecting confidentiality.

** The employers must be accountable to the ministry for the design, effectiveness and implementation of the workplace control programs.

1) incorporate and utilize all components of the Workplace Hazardous Materials Information System (WHMIS);
2) ensure the maintenance of records on substances used in the workplace, the quantities used and the magnitude of the exposures;
3) facilitate the process of identifying and controlling the hazards in the workplace while providing guidelines for employers and employees to work together to maintain the health of the workers;
4) reinforce the employer's accountability for the health and safety of the worker;
5) help integrate all existing control programs in the workplace and provide the framework for future control strategies that may be deemed necessary or that may be required by specific regulations, including designated hazards.

Ideally, workplace control programs should be sufficiently flexible to control all hazards in the workplace adequately. However, council considers that, with the present lack of information and expertise, there will be the need to legislate controls for specific substances or groups of substances that pose the most serious risk to the health of workers. In Advisory Memorandum 85-I council recommended criteria and a scheme to identify and rank substances requiring control and indicated that further investigation of these substances is necessary to determine the most appropriate control strategy.

The following issues require further consideration:

- the information and practical considerations required for this further investigation;
- the alternative strategies and regulatory options;
- the process of developing regulations; and
- alternative mechanisms for ensuring adequate opportunity for public input into the process.

RECOMMENDATIONS

ACOHOS RECOMMENDATION 85-15

that the Minister of Labour ensure that all workplaces have a workplace control program. The workplace control program should:

- be developed by employers with the knowledge of, provision for input from and be endorsed by, the joint health and safety committee;
- be performance oriented and consist of at least the components identified above (pages 119-121);
- be written;
- be available to all workers and ministry inspectors to aid in the assessment of the effectiveness of the control of hazards in the workplace;
- make a commitment to reassess the exposures to hazardous substances and agents with a view to reducing exposure.

Although council believes that all workplaces should have workplace control programs, it recognizes the difficulties associated with implementation; hence, council suggests that the minister consider phasing in the requirement according to industry sector. The 'high risk' industries, regardless of size, should be required to have programs first. Because council recognizes the difficulties such a requirement will cause to small industries, it stresses the importance of the ministry aiding industries to design and develop programs and suggests that an appropriately designed work book would greatly facilitate this process.

APPENDIX I

Definitions and Interpretations

For the purposes of this document, the definition of terms such as 'substance' and 'toxicity' have been expanded so that they include physical and biological agents with the potential to cause adverse health effects in the work environment. However, safety hazards such as explosives and flammables, where the risk is related to the physical characteristics of the substance and is dependent upon abnormal conditions of use of the substances, emergencies and spills, are not included (see definition of safety hazard versus health hazard in Attachment 3 of Appendix II or Reference 9). The Workplace Hazardous Materials Information System (WHMIS) should provide detailed criteria for the identification of such safety hazards as well as health hazards.

Adverse Health Effect – is any effect that will impair any bodily function* or will decrease longevity of workers or their offspring.

Substance – is used broadly in this document to include chemicals, mixtures, biological and physical agents.

Toxicity – is an inherent property of a substance. In this paper a toxic substance will be used to mean a substance that may cause an adverse health effect if a person is exposed to the substance in a particular way.

Exposure – describes the contact between the worker and the substance. Before a toxic substance can pose a risk to the health of a worker, the worker has to be exposed to the substance. The likelihood and the nature of the adverse health effect will depend upon the nature and extent of exposure of a worker to a toxic substance.

- *Nature of exposure* describes the route of exposure e.g. skin contact, inhalation or ingestion;
- *Extent of exposure* is a composite of the magnitude, the frequency and duration of exposure. The magnitude is a measure or estimate of the amount of the substance the worker contacts and expressed as a concentration in a solid or liquid being handled, ppm or mg/m^3 of air being inhaled and mg intake/kg of body weight.**

Hazardous substance – is used in this paper to describe a substance that is toxic.

Risk – a risk exists when an individual is exposed to a toxic substance in a way which could cause an adverse health effect to the individual or his/her offspring. Risk is expressed as the probability of the adverse health effect occurring.

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* In the context of this paper, impairment of bodily function applies to physiological or biochemical changes that may lead to mortality or morbidity. Variations on the definition of adverse effects are discussed in Reference 2.

** It should be stressed that these measures do not represent measures of the amount of substance reaching the target organ or tissue.

Control strategy – is any method used to limit workers' exposure to hazardous substances.

Regulation – is used to specify control strategies as legal requirements.

APPENDIX II

Programs for Providing Information on Hazardous Substances in the Workplace

United States: Occupational Safety and Health Administration

The United States Occupational Safety and Health Administration (OSHA) has promulgated a final occupational safety and health standard entitled 'Hazard Communication' (Federal Register, November 1983)*. The standard requires manufacturers and importers to assess the hazards of chemicals they produce or import, and employers to provide information to their employees concerning hazardous chemicals by means of hazard communication programs. The hazard communication program includes provision of labels, material safety data sheets, training and access to written records.

The standard applies to both 'physical' and 'health' hazards. Each of these terms is defined by listing the various types of 'physical' and 'health' hazards covered. These listed hazards are then individually defined or, in the case of 'health' hazards, further explained in appendix A. Appendix B provides further guidance to the employer in terms of the criteria to be applied in determining whether or not a chemical is hazardous for the purposes of the standard. Appendix C lists a number of sources that are available for employers in the search for information on hazards.

Chemical manufacturers and importers are required to evaluate the chemicals they produce or import to determine if they are hazardous. They are to be guided by the definitions, Appendices A, B, and C, and must consider substances currently regulated by OSHA, those listed by ACGIH in their latest edition of the 'Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment', and an employer must report any adverse health effect, for which there is scientific (i.e. statistically significant) evidence based on at least one positive study conducted in accordance with established scientific principles, that may occur as a result of employee exposure to a substance. The procedures used to evaluate hazards must be prepared in writing.

The hazard communication program is to be written and is to include how the employer plans to meet the criteria of the standard regarding labels, material safety data sheets and training, a list of the hazardous chemicals in each work area, the methods the employer will use to inform employees of the hazards of non-routine tasks, contractors etc. The written program is to be made available to employees, their designated representatives, OSHA and NIOSH. OSHA acknowledges that the guidelines for the hazard communication program are considered minimal requirements and that compliance with them does not constitute an outstanding occupational hygiene program by a company.

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* Hazard Communication: Final Rule, Occupational Safety and Health Administration, *Federal Register*, 48(228): 53280-53348 November 25, 1983.

The standard also specifies the conditions for trade secret disclosure, contents of labels, MSDSs and training. It is stressed that it is a generic standard and stated largely in performance language but that this does not alter the essential (mandatory) character of the standard.

The aim of the standard is not merely an identification of workplace chemicals but, more significantly, at the correction of the hazards as well. It is anticipated that this correction will occur largely as a result of employee compliance with instructions on how to protect themselves when exposed, as well as other hazard-reducing strategies adopted by employers (e.g. substitution and implementation of engineering controls).

Canada: Workplace Hazardous Materials Information System (WHMIS)

A major interdepartmental federal/provincial initiative to establish a consistent comprehensive Workplace Hazardous Materials Information System is underway in Canada. The final report tabled in 1985 recommends a standard which will be the basis for federal and provincial legislation to require all hazardous materials to be labelled. Manufacturers and importers will be required to produce material safety data sheets and transmit them with their products to all workplaces. All employers will be required to train their employees and inform them of the hazards within the workplace, the precautions required for handling specific substances, and what to do in an emergency.

Like the development of the OSHA hazard communication standard, the issue of protection of trade secrets versus the workers' right-to-know caused considerable discussion between labour and management representatives. The other major area of contention was the criteria for determining which substances are hazardous and hence should be labelled. It is interesting to note that the criteria are to be based on existing information and it is anticipated that, to meet the requirements of WHMIS, there will not be need for any additional testing. However, substances for which there is no data will have to be identified, i.e. labelled, and 'no data' will be recorded in the appropriate section of the MSDSs. Effort has been made to respect criteria developed by Transport Canada for transportation of dangerous goods (TDG criteria). However, as the hazards for transportation are not necessarily the same as, or inclusive of, hazards to the health and safety of workers in the workplace, there have been various modifications involving reclassification and expansion of the criteria.

At this stage it is still unclear what adoption of this final report will mean in terms of regulatory requirements for the provinces and how this will be mandated in individual workplaces.

CONTROL STRATEGIES

United Kingdom

Although it is not planned to discuss hazard determination, regulatory strategies, or workplace hygiene programs in the U.K., it is of interest to note that there is a move away from TLVs (from the ACGIH) towards guidelines or 'recommended limits'. The 'recommended limits' are considered to represent good practice and are used by factory inspectors as part of their criteria for assessing compliance. A health and safety executive explained that there are not enough toxicity data on most substances to warrant 'control limits'. Control limits have been set for less than a dozen substances.

Workplace Programs

Many large employers in Canada and other countries have developed their own workplace programs aimed at reducing hazards to workers. The programs vary in their content and application depending on the specific conditions and requirements of individual work sites.

Such workplace programs consist of four phases:

1) Recognition or hazard assessment which involves a knowledge of the toxicity of the substance, the mode and extent of (or potential for) exposure. Many employers use criteria to identify the most important hazards for specific worksites. This assessment will often determine the priorities for the second phase.
2) Evaluation of the hazard. This phase involves the monitoring of the hazard at specific worksites, determining worker exposures and training the employees.
3) The control phase will be dependent on the results of the hazard evaluation.
4) Evaluation of the controls and auditing the control processes.

Quebec

In Quebec there is, in legislation, an obligation for every employer to implement a prevention program. The prevention program is a plan of action adopted by an establishment to eliminate causes of work accidents and occupational diseases.

The preparation of the prevention program is a shared responsibility of workers, employers and health professionals. Once the program is developed, the employer is responsible for both its implementation and costs.

The Commission de la santé et de la sécurité du travail du Québec (CSST) has developed a number of tools to help employers and their establishments fulfil their obligations. A guide* describes the objectives and administrative aspects of the program and suggests a procedure to be followed to attain each objective. The appendices to the guide include: a glossary of terms; a reference list; relevant excerpts from the legislation; and the Regulation respecting prevention programs.

The legislator has identified a minimum content for the prevention program. There is provision for assessment of the workplace; identification of hazards and protective devices; training and information programs for the workers; and a program to monitor workers' health. In establishments with more than 20 workers, the program and the annual updating has to be transmitted to the commission.

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* Guide for the preparation of prevention programs by establishments.

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February 14, 1986

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational
Health and Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear ~~Dr.~~ Dennis McCalla:

Thank you for transmitting Advisory Memorandum 85-IV dealing with the issue of workplace control programs. As Council has stated in its summary prefacing the memorandum, the control of hazards in the workplace is indeed fundamental to occupational health and safety.

As Council has noted, some of the components addressed in the memorandum have already been included in the proposed amendments to the Occupational Health and Safety Act (Bill 101). Additionally, as I announced in the House on November 21, 1985, section 145 of the Industrial Regulations is being rewritten to provide greater protection to workers who may be exposed to toxic substances. Your advice is therefore timely, and should prove to be of great assistance in this task.

Please thank council members for their efforts in preparing this memorandum. A more detailed response will follow once my officials have had the opportunity to thoroughly review the document.

Sincerely,

Bill

William Wrye
Minister

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April 30, 1986

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

My officials in the Occupational Health and Safety Division have completed their review of Council's Advisory Memorandum 85-IV dealing with the issue of work place control programs and I am now in a position to respond to Council's advice.

The Ministry of Labour supports the concept of comprehensive control programs in each work place which provide for the identification and control of hazards. As indicated in my letter of acknowledgement dated February 14, 1986, the Ministry is undertaking initiatives which incorporate elements of Council's advice and which will assist in the internal recognition and correction of hazards extant in Ontario work places.

The first of these initiatives is the introduction of comprehensive right-to-know legislation. The right of workers to know about potential hazards in their work places is fundamental to the improvement of the health and safety protection of persons at work and on January 31st, 1986, I introduced Bill 101 to provide the workers of this province with this very important right. The proposed right-to-know legislation is in keeping with Council's advice as it provides for labelling, material safety data sheets, worker training programs, and the development and maintenance of inventories, all of which are basic components of the Level I general work place program described by Council. As I have made clear, however, this government would prefer a national scheme as recommended in the Workplace Hazardous Information System (WHMIS) report, if such a scheme can be implemented reasonably quickly, and for this reason will not proceed further with Bill 101 at this time. It is intended that the elements of Bill 101 not provided for in WHMIS, such as the requirement for inventories, would be mandated in the province of Ontario.

The second initiative includes the proposed amendments to section 145 of the Industrial Regulations to provide greater protection to workers who may be exposed to toxic substances. As with the proposed right-to-know legislation, the proposed revisions to section 145 incorporate aspects of Council's advice, including the requirement that employers reduce exposures to toxic substances through the use of engineering controls, with the use of respirators being permitted in limited and defined circumstances only, and the referencing of specific exposure criteria for toxic substances.

Consideration will be given to incorporating other aspects of Council's advice during the review and refinement of these and other legislative initiatives pertaining to the Occupational Health and Safety Act. We note Council's suggestion regarding a workbook to aid employers and joint health and safety committees in designing their work place control programs. As this is currently the practice in Quebec, we will be seeking further information on this approach from the Commission de la sante et de la securite du travail.

With respect to Council's overall advice that all work places be required to institute control programs in the form and manner described in the memorandum, while I agree with Council's proposal in principle, I have some questions regarding the implementation and enforcement of such a major initiative. In this respect, I would appreciate any advice that Council can provide in relation to the identification of so-called "high risk industries" for the purposes of phasing in the control program requirement; the criteria which must be applied in determining those conditions, substances or agents posing a serious hazard or not able to be controlled by "simple means", which necessitates the implementation of a Level 2 program; and the Ministry's role with respect to the monitoring of work places for compliance with the control program. With respect to the latter point, it remains unclear as to how a performance-oriented approach could be effectively enforced. While the Ministry could issue orders that a control program be established, it may be difficult to enforce the details of the program or require deficiencies in the control program to be addressed.

I thank Council for its work involved in the preparation of this memorandum and look forward to receiving further advice that it may wish to provide in this regard.

Sincerely,

William Wrye
Minister

Advisory Memorandum 85-V

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September 19, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear ~~Dr. McCalla~~ Dennis:

As you know on November 13, 1982, a Notice of Intention to designate arsenic along with seven other substances, was published. On August 6, 1983, a proposed regulation for arsenic was published in The Ontario Gazette. Following public comment, Ministry officials presented a revised arsenic regulation to interested parties at an open review meeting held on October 20, 1983. Since then Ministry officials have been reviewing the comments that were made at that meeting and subsequently in briefs submitted to the Ministry.

In December 1984, the Ministry distributed for comment a letter setting out options on whether or not to include underground mining and milling operations in the regulation. Although the proposed regulation exempts these areas, it should be noted that arrangements are being made with the Ontario Mining Association, the Mines Accident Prevention Association of Ontario and the appropriate trade unions to initiate studies on exposure levels to arsenic in underground mines and the absorption of arsenic by underground workers. Upon the completion of these studies and the final report of the miners study being conducted by Dr. J. Muller, expected by the end of January, 1986, the Ministry will re-evaluate the exemption.

I enclose a copy of the revised Regulation respecting Arsenic and Related Codes and my officials' "Report to the Advisory Council on the Designation of Arsenic in Ontario".

I appreciate that Council undertakes a comprehensive and thorough review of the development of designated substance regulations. I wish you to know that I place a high priority and urgency on the finalization of the arsenic regulation. I look forward to receiving Council's comments at the earliest possible date.

Officials of the Occupational Health and Safety Division would be pleased to meet with Council members to discuss the regulation at your earliest convenience.

Sincerely,

Bill

William Wrye
Minister

Enclosure

Ontario
Ministry of
Labour

Ministère
du Travail
de l'Ontario

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Program Development Unit
Occupational Health
and Safety Division

9th Floor
400 University Avenue
Toronto, Ontario
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January 10, 1986

Dr. J. W. Charters
Chairman
Task Force on Principles and Procedures
for Setting Standards and Regulations
Advisory Council on Occupational Health
and Occupational Safety
Ontario Ministry of Labour
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. Charters:

As was mentioned at the meeting of the task force with Ministry officials held on January 7, 1986 to discuss the arsenic regulation, the Ministry is considering alternate approaches to medical surveillance requirements in designated substance regulations. This review is being conducted in light of the advice from Council to the Minister in Advisory Memorandum 85-II on health surveillance, health screening and biological monitoring.

The Ministry has considered the criteria submitted by Council for determining whether medical surveillance should be mandatory or voluntary for arsenic and the likely benefits to accrue from a medical surveillance program. Ministry officials believe the approach, which is set out in a revised draft of the proposed arsenic regulation, should provide for medical examinations and clinical tests if the worker, the workers' physician, or the employer believes that the worker's health may have been affected by exposure to arsenic. The proposed revisions require the worker to undergo a medical examination and clinical tests to determine whether the worker should be removed from exposure to arsenic. This provision would not entail a medical surveillance program for all workers. This approach has also been included in the proposed regulation for chromium which is to be gazetted on January 18.

While the above position was presented to the task force on January 7, 1986 the Ministry has not adopted an inflexible position on the approach outlined in the arsenic regulation and welcomes any comments you may wish to make on it in light of two other approaches, namely the mandatory medical surveillance of all workers which was set out in the proposed arsenic regulation or an approach which provides for a mandatory medical surveillance program with a proviso that a worker could, upon written notice to the employer, withdraw from such a program.

A copy of the revised version of the proposed arsenic regulation is attached for review by task force members.

Yours truly,

Arthur Gladstone

Arthur Gladstone
Manager

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

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February 3, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
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Dear Mr. Minister:

On behalf of the Advisory Council, I am pleased to submit Advisory Memorandum 85-V. This advisory memorandum contains comments, suggestions and advice that resulted from council's review of the process used to develop the designated substance regulation for arsenic and the evaluation of the criteria utilized to assess the hazard of arsenic exposure in the workplace.

Due to the last minute change in the provisions for medical surveillance, council was faced with a serious dilemma; i.e. whether the resolution of an issue is more important than the process of resolving the issue and whether commenting on the solution would be construed as endorsing the process. Council understands the difficulties you face attempting to balance the sometimes conflicting needs of being sensitive to: the need for change; the need for an open consultative process and the desire to adhere to a reasonable time table.

I hope that the enclosed will be of value to you in your difficult task of developing regulations for the control of toxic substances in the workplace.

Yours truly,

D R McCalla

D. R. McCalla
Chairman

Encl.

cc to: T. E. Armstrong
Dr. A. E. Robinson
B. Goodman

Advisory Memorandum 85-V
to the Minister of Labour
January 24, 1986

A Review by the Advisory Council of the Process Used to Develop a Standard for Arsenic and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Arsenic Exposure in the Workplace

Council's review of the standard setting process leading to the development of the arsenic regulation focused on three aspects of the process: 1) the analysis of the background documentation (i.e. whether the ministry assembled, reviewed and analysed the available evidence in a reasonable fashion and whether the conclusions reached were compatible with the evidence), 2) the process (i.e. whether the public was provided with sufficient time, information and opportunity to comment on, and participate in, the development and content of the regulation), 3) the application (i.e. whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion).

In conducting its review council has, as in the past, considered the list of basic principles and procedures suggested in council's Advisory Memorandum 78-II.

BACKGROUND

On November 13, 1982 a Notice of Intention to designate arsenic (along with three other substances) was published in the *Ontario Gazette*. During the period November 1982 to July 1983 a number of briefs were submitted, meetings with interested parties were convened and mining and wood preserving plants were visited. On July 28, 1983 the Legislative Review Committee recommended designation, and on August 6, 1983 a proposed regulation and related codes were published. Further consultation, consisting of briefs and meetings, took place at an open review meeting in October 1983, prior to the presentation of a revised regulation.

Because of the concern aroused by the exemption from the revised regulation of various underground mining operations, the subse quent briefs and meetings were supplemented by a survey of the arsenic levels in underground mines. Consideration of these data led to an extension of the consultative process. On December 10, 1984 Mr. Ramsay, then Minister of Labour, wrote a letter to various interested parties outlining, and soliciting, comments on two options for handling the contentious issue of underground mines.

On September 19, 1985 the proposed arsenic regulation and related codes, dated August 30, 1985, were received by the Advisory Council on Occupational Health and Occupational Safety.

Following a preliminary review of the proposed regulation, associated codes and the extensive background material, which were presented in *The Report to the Advisory Council on the Designation of Arsenic in Ontario*, council's task force sought clarification on a number of issues at a meeting with ministry personnel on January 7, 1986. The agenda for the meeting, which listed the Issues for Discussion is Appendix 1, and Appendix 2 is a summary of the responses received from ministry personnel.

In response to one of the questions, the task force was informed that the regulation and the Code for Medical Surveillance were in the process of being amended. The revised draft regulation and the Code for Medical Examination were received by council on January 10, 1986.

1. Analysis of the Background Documentation

a) *Health Effects*

Council considered that the review of the data on the health effects of inorganic arsenic compounds was thorough and adequate. It was noted that the review focused on the epidemiological studies that indicated that arsenic inhalation is associated with an increased incidence of respiratory cancer. This approach to the literature review is understandable as ingestion is not considered a likely route for occupational exposure. Choosing control strategies designed to avoid the carcinogenic effects of arsenic trioxide and pentavalent arsenic compounds is considered an appropriate approach that should also prevent the manifestation of other health effects associated with these compounds.

Council expresses concern at the lack of an analysis of the data available on the health effects of arsine, especially the chronic renal effects. Council considers that, when it is the intention of the minister to regulate a group of substances, it is important to gather the available data on all the substances, and the data, together with the interpretation, should be made available for public scrutiny prior to the publication of a proposed regulation.

Council acknowledges that, to date, the data on the carcinogenicity of arsenic are inadequate to determine with any degree of certainty the risk associated with specific exposures, the mechanism of the carcinogenic action or whether or not workers with chronic exposure to low doses have a higher or lower risk of cancer than workers chronically exposed to high doses of short duration.

However, some of the data indicate that the incidence of respiratory cancer is more directly related to the intensity of the exposure than to the duration or the cumulative (duration x intensity) exposure. Council also notes that the few individuals who are most likely to be chronically exposed to arsenic trioxide are more likely to experience short-term, high intensity exposures than constant low exposures. These high intensity short-term exposures could average to values less than the TWA limit each week, especially when the averaging period is 40 hours. As council considers it of utmost importance that such workers be protected by this regulation, it suggests that a short-term exposure limit should be included in the regulation.

ACOHOS RECOMMENDATION 85-16

that the Minister of Labour include in the designated substance regulation for arsenic a provision to protect workers from high intensity, short-term exposures.

b) *The Risk Assessment*

In Advisory Memorandum 84-I council noted the difficulties involved in using poor epidemiological data to arrive at a specific number to be used as the Time-Weighted-AverageExposure-Limit (TWAEL). In the case of arsenic, the epidemiological studies indicate that arsenic as arsenic trioxide, and, possibly, in its pentavalent form, is carcinogenic. However, data on exposures are very weak, as is the evidence for a dose-response relationship. The statistical method chosen by the ministry assumes that there is a straight-line relationship between the dose (exposure) and the response (probability of developing cancer). However, the data employed for the plot used cumulative exposure as a measure of dose. This means that it was assumed that intensity and duration are interdependent and that the cumulative dose can be computed as a product of these two variables. This issue was discussed with ministry personnel, and although it was agreed that risk is a function of both intensity and duration of exposure, council does not consider that there is any evidence to suggest that they are *inter*dependent. Council understands that the data used in the risk assessment were presented in the literature only as cumulative dose. It would appear from the background information that there was no attempt to obtain the raw data or to analyse other data to consider intensity and duration separately, at least to check whether this assump tion was valid. It also appears that no other estimates of risk were made using other statistical models. The data presented in the literature appear to indicate that arsenic is not a primary carcinogen, hence the assumptions used to choose the particular mathematical model may not apply. Council understands that the estimate of risk is consistent with that derived by the Occupational Health and Safety Administration (OSHA) in the United States using the same data but a slightly different method, and that the exposure level derived from the risk assessment has subsequently been upheld as valid by the courts in the United States. Council suggests that the risk assessments performed in other jurisdictions should be reviewed, critiqued and, when appropriate, used as the basis for the risk assessments performed by the Ministry of Labour. Council's main concerns with the risk assessment are related to the process and methods used to interpret and analyse the available data.

In accordance with ACOHOS Recommendation 84-1 council recommends:

ACOHOS RECOMMENDATION 85-17

that the health effects document and any risk assessment prepared for the Minister of Labour clearly indicate the assumptions made for the interpretation and use of the data and the uncertainties associated with a) the data, b) the methods used for interpreting the data, and c) the final values.

Council further recommends:

ACOHOS RECOMMENDATION 85-18

> that the health effects document and any risk assessment prepared for (by) the ministry, be peer reviewed by outside experts prior to being used as the basis for decision making.

c) *Arsenic Use and Exposure in Ontario*

As noted in the background material provided to council, arsenic is an element that is present in numerous compounds and forms, each with distinct chemical, physical and toxicological properties as well as having numerous different industrial uses each providing a broad potential for different forms of worker exposure. Although all inorganic compounds and forms of arsenic were included in the August 1983 proposed regulation, the data collected on use, exposure, controls, etc., were mostly limited to exposure and potential for exposure to arsenic trioxide and to the pentavalent forms of arsenic used in the wood preserving industry. Council notes with concern that in early 1984 there were few, if any, data on conditions and exposure to arsenic in underground mines even though 73 per cent of the work force affected by the regulation at that time was estimated to work in underground mines. In fact, the detailed survey of arsenic in underground mines was only undertaken after the processes performed at these work sites were excluded from the regulation. Council also notes that there was a paucity of exposure data for pentavalent arsenic even though a number of wood preserving plants were visited. Similarly, there were only few data on potential for arsine exposure.

ACOHOS RECOMMENDATION 85-19

> that the Minister of Labour ensure that exposure and health effects data on industries and substances that are to be included in regulations are collected, assembled and interpreted prior to the publication of a proposed regulation.

This recommendation is consistent with ACOHOS Recommendation 84-3, which stated that the initial draft of a regulation should come as close as possible to the final regulation.

Council realizes that the initial stages of developing this regulation commenced several years ago and that the process has recently changed to include consultation in the early phases of collecting the background information, that is, when substances are being considered for designation. Council strongly supports these recent initiatives.

2. **Process**

The process briefly described in the Background and summarized in Figure 1 differed from the process used for previous designated substance regulations in two major respects:

1) The background survey of arsenic use and exposure in Ontario was performed and assembled by ministry personnel rather than by outside contractors. Although more onerous, council recognizes the numerous advantages of this approach, and suggests that, where possible in future, the ministry

   a) establish contacts and communication with affected and potentially affected parties at the beginning of the data gathering process;
   b) solicit co-operation from the affected parties in the data gathering and, where necessary, data-generating steps of the process.

2) Near the end of the process, Mr. Ramsay, then Minister of Labour, sent a letter to various affected parties soliciting comments on two options to resolve a difficult and contentious issue. Council commends the effort to further consult on a contentious issue. In the meeting with the ministry the task force questioned the choice of the specific options and the reason for the *form* of this correspondence (see Appendices I and II).

   Council suggests that, if this mechanism is used to solicit public comment in future, provision should be made to allow the responses to be available for review. Council agrees that the health effects data presently available are inadequate to determine whether or not arsenic in minerals is carcinogenic when inhaled. Council stresses the importance of carefully considering all the available data prior to making a decision to include (or exclude) substances or processes, and of ensuring that the decision-making process involves extensive consultation, that it is open and a commitment is made to collect and review relevant data and process(es) at specified intervals. With respect to arsenic, the review of the exemption of underground mining operations should be conducted when the relevant data are assembled and the data and review process should be open and available for public comment.

As the exemption of underground mining operations from the regulation has proved highly controversial, and as control of arsenic in underground mines will be according to the requirements of the mining regulations, council recommends:

ACOHOS RECOMMENDATION 85-20

that the mining regulations be carefully reviewed and amended as needed to ensure that there are provisions for the protection of workers from exposures to substances or conditions that have the potential to cause adverse effects to their health and, further, that there is a provision in the regulations to update exposure limits as new data become available.

Council commends the ministry for the inclusion into the process of notices to affected parties describing the changes being considered and including the reasons for making the changes and soliciting comments.

In its review of the process involved in developing designated substance regulations in the past, council has suggested that the comment periods be specified and consistent. However, council stresses the importance of taking into consideration holiday periods and the practicality of soliciting comments within 30 days spanning the Christmas-New Year period.

3. Application

The designated substance regulations have evolved into a relatively standard legal format. Comments regarding this general format have been noted in previous reviews.

Following the review of the arsenic regulation, council noted that:

1) arsine had been exempted from the regulation. It was indicated in the background material (Volume 1, page 82) that exposure to arsine could be controlled under section 20 of the *Occupational Health and Safety Act* or under section 145 of the Industrial Regulations. However, apart from the electronics industry, exposures to arsine are most likely to be due to unforeseen accidental release of a by-product, hence section 20 could not be applied. Council understands that section 145 of the Industrial Regulation is being considered for amendment. Prior to reviewing the proposed amendments it is difficult for council to anticipate how they will affect the powers of the ministry to ensure the control of arsine in the workplace.

   It is also understood that, due to its very different physical, chemical and toxic properties, it may not be appropriate to include arsine in the designated substance regulation for other inorganic arsenic compounds. However, council stresses the need for a provision in the regulation for the strict control of arsine, aimed at preventing accidental release and also designed to provide guidance for the electronics industries that are planning to use arsine in the production of gallium arsenide computer chips. This issue was discussed with ministry personnel (see Appendices I and II);

2) underground mines are exempt from the regulation. This issue has been discussed above (under Process);

3) section 8.1 was removed from the revised regulation presented at the open review meeting but was reintroduced in the proposed regulation (August 1985). The rationale for these changes was explained in the background material, and the issue was discussed with ministry personnel (see Appendices I and II).

   Council considers that, regardless of the availability of technology at the time of proposing the regulation, regulations for carcinogens and/or substances, where there is an obligation to reduce exposures to the 'lowest practical level', should include a requirement to adopt and implement new technology to reduce exposure as it becomes available and when it is reasonable or practical to do so;

4) the Code for Medical Surveillance did not include any tests or requirements specific to arsenic. Council questioned the value of including in the regulation a specific Code for Medical Surveillance. This issue was discussed with ministry personnel (see Appendices I and II), and

the task force was informed of amendments being made to the regulation and the code such that the medical surveillance would only be required under certain circumstances (see Appendix III).

Council's review of the designated substance regulations focuses mainly on the process of developing the regulation, but it does consider content, especially for such issues as whether the conclusions reached are compatible with the evidence.

The amendments proposed for medical surveillance, and received by council on January 10, 1986, presented council with a serious dilemma. On the one hand, the amendments were proposed very late in the process, even late in council's review of the regulation, which is usually the final stage prior to the regulation going to cabinet.

Council has always considered that last minute changes should be avoided if possible, and that substantive changes should be open for review by affected parties. On the other hand, council, in its review of the arsenic regulation, had questioned the rationale for medical surveillance as there are no tests or requirements specific to arsenic and no means of detecting respiratory cancer at a stage when intervention can significantly alter the disease course. In this regard, council has also offered the minister advice on health surveillance, including criteria for determining when tests should be mandatory (see Advisory Memorandum 85-II).

Hence, in principle council supports the changes proposed,but has reservations about the process used to make the amendments.

With respect to the content, council supports the concept that medical surveillance should not necessarily be a mandatory component of all control programs, and it considers the amendments proposed for the arsenic regulation to be steps toward a more flexible approach. However, it is noted that in section 14(1) 'the worker shall, at the expense of the employer, undergo a medical examination . . . ' if the employer considers that a worker's health is likely to be affected.

Council considers that the medical examination should be voluntary and suggests that 'the worker shall *be offered*, at the expense of the employer, the *opportunity* to undergo a medical examination. . . .'

It is also noted that there appears to be a distinction between sections 14(1)(a) and 14(1)(b), the conditions necessary for a worker to initiate a medical examination as compared with conditions necessary for an employer to initiate a medical examination.

Council considers that sections 14(1)(a) and 14(1)(b) should both read '. . . has reason to believe that the worker's health is likely to be affected by. . . .'

Section 14(1) also implies that the sole purpose of the medical examination is 'to determine whether the worker is fit, fit with limitations or unfit for work in arsenic exposure.' This is inconsistent with the objectives of the medical examination stated in the code.

Council considers that the objectives of the examination should be to:

a) evaluate the health effects of the absorption of arsenic in workers;
b) evaluate remedial action to be taken when necessary, and
c) provide additional health education.

As the medical examination is no longer mandatory, it is important that the health education on the effects of arsenic should be a mandatory component of the control program and that this health education should be supplemented by further information when and if a medical examination is provided.

Council suggests that section 14(1) should be amended to reflect more accurately the objectives of the examination.

And, finally, council notes that if the medical examinations are voluntary and made according to the proposed regulation and code, it would not constitute a medical surveillance program as indicated in section 7(3).

With respect to the process, council notes that:

a) medical surveillance has been included in all previous designated substance regulations and parties wishing to comment on content or format have done so on numerous occasions in the past. Council has also offered its advice on health surveillance in Advisory Memorandum 85-II;

b) the amendments proposed are substantive. The proposal to include medical surveillance/examinations as an optional component of a control program required under a designated substance regulation is included in the proposed chromium regulation, published on January 18, 1986 in the *Ontario Gazette*. This latter proposed regulation is now available for public review, and comments are being solicited.

Council understands that to await these comments or to consult with affected parties about the proposed amendments to the arsenic regulation would cause an unfortunate delay in what has already been a lengthy process. However, council is concerned at the lack of consultation and suggests that if the minister includes these amendments into the arsenic regulation the comments on the proposal in the chromium regulation be carefully reviewed, and, if necessary, consideration be given to amending other designated substance regulations, including that for arsenic. Council also stresses that the need for, and content of, the Codes for Medical Surveillance/Examination should be considered separately for each substance or regulation and that this proposal should not be used automatically as a prototype for all future regulations;

5) the techniques for sampling arsenic trioxide in the workplace specified in the Code for Measuring Airborne Arsenic will not produce consistent results.

It is acknowledged that the variations are probably not due to any systematic errors in the techniques *per se*, but are due to the conditions at the worksite as well as to the chemical and physical properties of arsenic trioxide.

In discussion with ministry personnel it was confirmed that personal samples are consistently higher than area samples and that the random variation between samples could be as high as 10 to 1. Council is concerned that if enforcement of designated substance regulations depends upon the levels of arsenic trioxide determined at a workplace, these variations should be understood and taken into consideration.

ACOHOS RECOMMENDATION 85-21

that the Minister of Labour authorize a study to investigate the techniques for sampling, handling and storing samples in an attempt to:

1) determine the source and degree of variation, and
2) create a data base so that if the source of variation cannot be eliminated, there are background data to aid in the interpretation of the values obtained.

The objective of the study should be to understand the nature and source of the variations among the samples collected in the workplace so that sampling results can be interpreted to be accurate representations of the exposure of the workers. If necessary, the use of area sampling as a means of determining compliance should be reviewed.

APPENDIX I

Issues for Discussion at the January 7, 1986 Meeting Between Ministry Personnel and Members of the Task Force on Principles and Procedures for Setting Standards and Regulations (Subcommittee to Review the Process Used in the Development of the Proposed Arsenic Regulation)

Data Gathering Process

1. As the proposed regulation (August 1983) was intended to include all workplaces (except construction projects) and all inorganic arsenic compounds including arsine, why did the ministry not collect the relevant background information on underground mines?

Consultative Process

2. Why were only two options offered for public comment in December 1984?
3. What was the process of arriving at these two options?
4. Why were the options presented in a letter from the minister in addition to the notice circulated from the ministry? That is, why were comments on the options directed to the minister while other comments on the regulation were directed to ministry personnel?
5. Was any consideration given to the option of including mines but specifying alternative, or modified, control programs (i.e. including action levels)?

Analytical Process

6. What was the rationale for choosing a statistical analysis that assumes a straight line relationship? That is, was the data interpreted to indicate that intensity and duration of exposure are interdependent variables?
7. What was the rationale for removing the short-term exposure limit from the regulation?

Technical-Legal Process

8. What is the rationale for including mandatory medical surveillance in the regulation?
9. What was the rationale for removing (and then including) section 8.1 of the regulation?
10. Are the techniques to be used on site to measure exposures reproducibly in the range 1-10 $\mu g/m^3$ accurate and feasible?
11. How will the proposed amendments to the Act and Industrial Regulations affect the control of substances and processes excluded from this regulation?
12. Is the exemption of underground mines considered to be interim? If so, what does this mean?

General Questions

13. When will the Muller study be completed?

14. What has been or is being done about the proposed studies on exposures in underground mines and absorption of arsenic from such exposures?

15. What is being done about arsine? Is another form of regulation being considered? What mechanism is in place to monitor the use and/or release of arsine in the electronics industry?

16. Is there going to be an omnibus regulation to amend all designated substance regulations? If so, when?

APPENDIX II

Summary of the Responses to 'Issues for Discussion' at the Meeting Between Ministry Personnel and Members of the Task Force on Principles and Procedures for Setting Standards and Regulations (Subcommittee to Review the Process Used in the Development of the Proposed Arsenic Regulation)

Question 1 (See Appendix I)

It was explained that the process of developing regulations is complex. The collection of data is expensive and timeconsuming, and the ministry is trying to improve the means of identifying issues that are, or have the potential to be, important. The process of involving labour and management to obtain more complete information at the beginning of the process is currently being used. It was explained that the process of developing the arsenic regulation started more than three years ago, and, at that time, it was the ministry's belief that underground mining would not be a problem. There were virtually no data available, either in Ontario or in the literature. The events that led to the exemption of underground mining opera tions were described, and the major problems encountered included:

1) the number and variety of arsenic bearing minerals;
2) assessments would be required at frequent intervals due to changing conditions;
3) the lack of health effects data on arsenic bearing minerals.

Questions 2 and 3

The absence of evidence indicating that exposure to arsenic-bearing minerals is hazardous to health was the main reason for exempting the underground mining operations from the regulation. This change in the proposed regulation provoked serious criticisms and comments from labour and prompted a further in-depth study of the literature and consultations with numerous medical and health professionals.

The conclusion was that further study was required, but, at that point in time, there was no valid medical or scientific reason to include underground mines in the regulation. Hence, the only options were: to go ahead with a regulation exempting under ground mines while the studies are underway or to await the results of the studies. It was also pointed out that including mines, which may later be excluded, would cause considerable administrative and financial problems. It was concluded that, at present, there is insufficient evidence that workers are at risk from exposure to arsenic in underground mines to warrant including them in the regulation. Until the decision to include them is made, workers would be protected by the existing provisions of the Regulations of Mines and Mining Plants.

It was pointed out that the minister's letter (December 10, 1984) did not rule out other options, but indicated that, with the present information, the two options presented were those receiving serious consideration by the ministry.

Questions 12, 13 and 14

As a continuation of the discussion, it was explained that Dr. Muller's study of goldminers is expected to be completed by the spring of 1986; meetings were being held with the Mining Association, Mines Accident Prevention Association and the unions involved to work out the sampling strategy for studying exposures in underground mines, also to work out a method for studying arsenic absorption among underground miners. It was anticipated that by the end of 1986 all the data will be available for review and a decision of whether or not to include underground miners in the regulation will be made.

In response to questions from task force members, it was clarified that the exemption is not interim *per se*, but that the minister is committed to a review of the decision when certain specified data have been collected. It was stressed that although no deadline is specified for this review, this commitment is distinct from the general commitment to review all new data as they become available.

Question 4

It was explained that comments were solicited by a letter from the minister, as opposed to a notice from the ministry, in order to highlight the importance of the issue. The responses indicated that it was an effective means of emphasizing the issue and initiating consultation with interested and affected parties.

It was clarified that all the responses were analysed by the same people in the same manner and that the comments were summarized in the background material presented to council and could be made available for council's review if necessary.

Question 5

The response to this question centered on earlier comments regarding the lack of evidence to include mines in the regulation. It was pointed out that if there was a lack of evidence to indicate that mining should be included there would be no reason to consider alternative control programs within the regulation.

Question 6

The reasons for assuming a straight-line relationship were cited as: it is the simplest model and, without evidence to indicate otherwise, it is customarily used.

With respect to the second part of the question, it was explained that, according to the studies by Pinto and Enterline, both intensity and duration affect risk. The data presented in Table 12 of Appendix A of Volume 2 were interpreted as indicating that the total amount of arsenic inhaled determines the risk of developing lung cancer. The problems involved in interpreting the data were cited: the numerous factors that affect risk, e.g. smoking; the variation in levels of, and dynamics of, exposure; the lack of understanding of the mechanism of the arsenic-induced carcinogenesis;

latency periods; variations in the exposed population, etc. As all these factors are unknown, and as the data are themselves soft and represent extrapolations, the simplest interpretation was preferred.

There was a discussion of the difficulties and uncertainties involved with such an approach, and it was agreed that any shape line could be generated, depending on the number of variables one wished to consider.

In response to questions about the specific interpretation of the data, it was pointed out that the standard was developed on the assumption that a worker can work his full working life in conditions such that any increased risk to his health will be minimal. The importance of having a consistent conservative policy was stressed.

Question 7

It was explained that the Short-Term Exposure Limit (STEL) was initially included in the regulation mainly to protect workers against the toxic effects of arsine. It was also considered important to solicit comments on the value of including a STEL for other arsenic compounds. It was noted that other jurisdictions do not include a Short-Term Exposure Limit if arsine is not included in the regulation. Hence, when arsine was exempt from the regulation and when the comments received indicated that there were no health effects data to justify a STEL for arsenic, it was decided to remove the STEL from the regulation.

Question 8

The response to this question is reproduced as Appendix III.

Question 9

It was explained that the inclusion of section 8.1 was dependent upon the belief that the technology to reduce, by engineering controls, the exposure level below the limit is not currently available. The reasons for taking it out and reintroducing it were described in the background material contained in Volume 1. It was stressed that the requirement provided by section 8.1 was quite distinct from the general requirement to reduce the level of exposure as low as practical. In the former case the owner is required to review new technology as it emerges and to adopt it if it is reasonable and practical to do so.

Question 10

It was explained that monitoring exposures involves two distinct steps: sampling and analysis. The sampling method described in the code is 'state of the art' and equivalent to the method recommended by NIOSH and consistent with the standard dust sampling that is used worldwide and considered to be accurate.

The analytical technique is also 'state of the art', capable of reproducibly detecting low levels of arsenic.

The data quoted in the background material were obtained using potassium arsenite down to 5.3 $\mu g/m^3$ of arsenic in air, and the 11 samples were within 10 per cent of one another.

It was acknowledged that the vagaries of the workplace introduce errors that are not systematic errors of the techniques themselves. It was confirmed that 30 to 40 per cent variation was not uncommon for parallel samples.

Some of the vagaries of the workplace were described as: air currents created by workers; attraction of dust particles; work habits, etc.

It was pointed out that the tremendous variations in personal samples taken within the workplace are representative of the exposures particular workers are experiencing. It was stressed that the validity of the technique is determined by the lack of systematic errors, i.e. errors due to the technique, not by random errors due to varying conditions in the workplace. It was acknowledged that personal samples are consistently higher than area samples for all particulates, and that this difference can be as much as 10 to 1.

In response to a question from a task force member, it was explained that, in the case of arsenic trioxide, the chance of losing the vapour through the filter is not very high as the filters are specially treated with sodium carbonate and glycerol. The glycerol traps the particles and vapour, and the sodium carbonate reacts with the arsenic trioxide to form sodium arsenite, which is non-volatile.

Question 11

The proposed amendments to the Act were not considered likely to affect the control of substances and processes excluded from the regulation. However, the proposed amendments to the industrial regulations announced by the minister include the adoption of exposure levels that would cover the substances excluded from the designated substance regulations.

APPENDIX III

OHB
DR. P.L. PELMEAR
APRIL 21, 1986
965-3211

ISSUE

- ACOHOS QUESTION--WHAT IS THE RATIONALE FOR INCLUDING MANDATORY MEDICAL SURVEILLANCE IN THE ARSENIC REGULATION?

RESPONSE

- WHEN THE ARSENIC REGULATION AND ITS CODES WERE DEVELOPED IN 1983, THE STANDARD FORMAT WITH MANDATORY MEDICAL SURVEILLANCE WAS PROPOSED. FOLLOWING THE PUBLIC MEETING ON OCTOBER 20, 1983, COMMENTS WERE RECEIVED, BUT THE CONCERNS WERE RESTRICTED TO THE FREQUENCY OF EXAMINATION AND THE SELECTION OF PHYSICIAN. ONLY THE OFL ADDRESSED THE MANDATORY NEED FOR EXAMINATION AND CLINICAL TESTS.

- ON OCTOBER 17TH, 1985, THE MINISTRY RECEIVED THE ADVISORY COUNCIL'S MEMORANDUM 85-II ON THE CLASSIFICATION OF HEALTH SURVEILLANCE, HEALTH SCREENING AND BIOLOGICAL MONITORING PROCEDURES IN WORKPLACE BIOMEDICAL SURVEILLANCE PROGRAMS. THIS REPORT QUITE RIGHTLY EMPHASIZED THAT MEDICAL SURVEILLANCE SHOULD BE COMPLEMENTARY TO GOOD INDUSTRIAL HYGIENE PROCEDURES AND THAT THE PREVENTIVE OR THERAPEUTIC ACTION MUST NOT SIMPLY ADVANCE THE POINT IN TIME AT WHICH THE DIAGNOSIS OF DISEASE OCCURS BUT ALSO IMPROVE SURVIVAL, FUNCTION OR BOTH. THE PRIMARY OBJECTIVE SHOULD BE TO PROMOTE THE HEALTH OF WORKERS AND TO PREVENT THE OCCURRENCE OF OCCUPATIONAL DISEASES AND INJURIES.

- THE MANDATORY CODE FOR ARSENIC AS WRITTEN (EXAMINATIONS AT LEAST ONCE EVERY THREE YEARS), ALTHOUGH MEETING THE REQUIREMENTS FOR THE FIRST TWO POINTS, DOES NOT COVER THE THIRD. THE PRE-SYMPTOMATIC EXAMINATION OF ARSENIC-EXPOSED WORKERS WILL ONLY DETECT A FEW IF ANY OF THE ACUTE AND CHRONIC EFFECTS.

- THE MINISTRY HAS THEREFORE CONCLUDED THAT, IN THE LIGHT OF THE ADVISORY COUNCIL REPORT 85-II AND THE NEW FORMAT FOR MEDICAL SURVEILLANCE OF CONSTRUCTION WORKERS, THE CODE FOR MEDICAL SURVEILLANCE FOR ARSENIC WORKERS SHOULD ONLY APPLY IF (A) A WORKER HAS INHALED OR INGESTED ARSENIC AND IS LIKELY TO BE AFFECTED THEREBY OR (B) A WORKER HAS REASON TO BELIEVE THAT HIS HEALTH HAS BEEN AFFECTED BY EXPOSURE.

- IN THIS SET OF CIRCUMSTANCES THE WORKER SHALL, AT THE EXPENSE OF THE EMPLOYER, UNDERGO MEDICAL EXAMINATIONS AND TESTS AS INDICATED IN THE CODE.

- THE REQUIRED AMENDMENTS TO THE REGULATION AFFECTING SECTIONS 7 AND 13 ARE BEING DRAFTED AND WILL BE MADE AVAILABLE TO COUNCIL BEFORE THE REGULATION IS FILED.

- WE ARE GRATEFUL TO COUNCIL FOR RAISING THIS ISSUE AND REMINDING US THAT THE REGULATION SHOULD BE MORE APPROPRIATE AND RELEVANT IN THIS RESPECT, AND WE TRUST THAT THIS PROPOSED MODIFICATION NOW MEETS WITH YOUR APPROVAL.

APPENDIX IV

Development of Arsenic Regulation and Codes

	Process
November 13 1982	Notice of Intention to Designate
	← Briefs, Submissions (11 + 13)
	← Meetings ('some of the interested parties')
	← 12 Plants Visited (mining and wood preserving)
July 28 1983	Legislative Review Committee Recommended Designation
August 6 1983	Proposed Regulation and Related Codes Published
	← Briefs (12)
	← Meetings ('interested parties')
October 20 1983	Revised Regulation and Related Codes Open Review Meeting
	← Briefs (8)
November-March 1984	← Meetings (industry and labour) listed with dates
May 18, 1984	← Campbell Red Lake Mine Visited
June-October 1984	← Survey of Arsenic Levels in Underground Mines
December 10 1984	Minister's Letter Outlining Problems and Options
	← Consultation (mining industry and organized labour)
January-March 1985	← Briefs (5)
September 19 1985	Advisory Council

Biotechnology Workshop

Ontario
Advisory Council on Occupational Health & Occupational Safety
Conseil consultatif de la santé et de la sécurité au travail

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Office of the Chairman
Bureau du président

400 University Avenue
Toronto, Ontario
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416/965-2448

May 14, 1985

The Honourable R. H. Ramsay
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Ramsay:

Your letter of February 15, 1985 requested council's advice on policies and procedures necessary to protect the health and safety of workers involved in the use of biotechnology. Council would like to commend you on your desire to take a proactive approach.

As biotechnology is a complex and rapidly developing field with enormous potential, council considers it necessary to briefly review the science and the activities of other jurisdictions. Of specific interest are activities directed towards assessing risks and establishing policies and procedures for notification, review and possible control of biotechnology. As a means of gathering this information, council has decided to organize a small workshop on the likely impact of biotechnology on occupational health and safety. It is anticipated that after the workshop, council will be able to assess whether or not there is a need for specific action regarding biotechnology and whether or not there is a role for council in providing advice on the establishment of policies and procedures.

Yours truly,

D. R. McCalla
Chairman

cc to: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
B. Goodman

Ontario

Office of the
Minister

Ministry
of
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400 University Avenue
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M7A 1T7
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May 29, 1985

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
400 University Avenue
15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of May 14, 1985, in which you advise that Council has decided to organize a workshop on the likely impact of biotechnology on occupational health and safety. I commend you on this decision. The workshop should provide an excellent forum in which to learn of the potential applications and possible hazards associated with biotechnology. As a result of this workshop, I look forward to receiving Council comments on whether there is considered to be a need for specific action by this Ministry in relation to potential hazards to workers resulting from biotechnology processes and whether Council will prepare an advisory memorandum on the subject.

Yours sincerely,

R.G. Elgie, M.D.
Minister.

Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Office of the
Chairman

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400 University Avenue
Toronto, Ontario
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March 24, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Minister:

In response to the request for advice on biotechnology from Mr. Ramsay, then Minister of Labour, council organized a workshop, the purpose of which was to help council and ministry personnel understand what biotechnology is, its potential applications, the concerns and potential hazards associated with its use, and what is being done to oversee the development of this new technology. The workshop consisted of presentations on various aspects of biotechnology followed by an open discussion. Representatives from labour, management, safety associations and various ministries of the governments of Ontario and Canada were invited to attend and participate. Council found the workshop interesting, informative and most useful. It also proved to be a valuable forum for communication amongst the affected parties.

Council recognizes the importance of biotechnology and its potential applications. However, due to the uncertainty concerning the potential effects of biotechnological products and processes on health and the environment there may be risks to the health and safety of workers. Council believes that this complex subject warrants careful and detailed study. Council is proposing to establish a task force on the implications of biotechnology for the workplace.

In the meantime, it gives me pleasure to transmit to you the proceedings of the workshop held on October 29, 1985. Dr. Slotin, Mr. Gilhooly, and Mr. McIntyre submitted the texts of their presentations. The other presentations were edited from a verbatim transcript and approved by the speakers. Hence, the views expressed in these proceedings represent the views of the individual speakers and should not be construed as reflecting the opinion of council.

Yours truly,

DR McCalla

D. R. McCalla
Chairman

Encl.

cc to: T.E. Armstrong
Dr. A. E. Robinson
B. Goodman

Advisory Council on Occupational Health and Occupational Safety

Biotechnology Workshop

Held October 29, 1985

Royal York Hotel, Toronto, Ontario

Editor's Note

The views expressed in these proceedings represent the views of the individual speakers and should not be construed as reflecting the opinion of council.

Dr. Slotin, Mr. Gilhooly and Mr. McIntyre submitted the texts of their presentations. The other presentations were edited from a verbatim transcript and approved by the speakers.

The Advisory Council on Occupational Health and Occupational Safety wishes to thank all those who contributed to this workshop. The success of the workshop was dependent not only on the high quality of the presentations but also on the excellent participation of the attendees.

Advisory Council on Occupational Health and Occupational Safety

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Chairman, Advisory Council

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[1] Presentations were edited from the transcript and approved by the speakers.
*Reproduced from text of presentation submitted by speaker.

Participants at the Biotechnology Workshop October 29, 1985

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Peter Chmara	Mines Accident Prevention Association of Ontario
Frank Eady	Horticultural Research Institute of Ontario
John R. Evans	Allelix Incorporated
Janet Ferguson	Ministry of State for Science and Technology, Canada
Claire Franklin	Health and Welfare, Canada
Joseph Gilhooly	Law Reform Commission of Canada
Alan Goldhammer	Industrial Biotechnology Association, Washington
Neil Gray	C-I-L Incorporated
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Lorne Heard	Workers' Compensation Appeals Tribunal
Lynette Hixon	Energy and Chemical Workers Union, Local 67
Goff Jenkins	Ontario Ministry of the Environment Agricultural and Industrial Chemicals Section
Irene Krahn	Health Care Occupational Health and Safety Association
Douglas Macdonald	Canadian Environmental Law Research Foundation
Mohammed S. Mahdy	Ontario Ministry of Health Laboratory Services Branch
Anthony Mazzocchi	Workers Policy Project – New York
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Proceedings of the Biotechnology Workshop October 29, 1985

WELCOME –
CHAIRMAN OF MORNING SESSION – DR. McCALLA

I would like to begin with a short word about the Advisory Council on Occupational Health and Occupational Safety. It was created by order-in-council in 1977 as part of the thrust by the Ontario government to improve health and safety in the workplace. Its primary objective is to advise the Minister of Labour on all matters relevant to occupational health and safety in Ontario. There are several detailed terms of reference, two of which are relevant to today's activities:

1) to review and make recommendations on the introduction of new substances, such as chemicals, in the workplace; and
2) to review and make recommendations regarding areas where there are no formal health and safety programs or where the programs are judged to be inadequate.

The council has spent considerable time considering areas such as new chemicals; offering advice on screening new chemicals for potential carcinogenic activity; on the principles that should govern priority setting in terms of substances selected for examination for possible regulatory attention, and other related projects are under way.

The initial impetus for today's session grew out of discussions with senior officials of the Ministry of Labour. Biotechnology is developing rapidly. It is important to the economy of the country. Biotechnology offers many opportunities but the question is – what will be the downside in terms of risk, particularly risk to workers in the industry?

We explored, as a council, some aspects of biotechnology and decided that we needed to learn more about the subject, including more about what is going on in the country and the views of labour and management.

We realize that biotechnology has been with us since the first of our ancestors found fermented vegetable juices and found out what that would do for mankind! We further realized that organisms are modified naturally and that in the last couple of centuries the process of selecting for these naturally occurring variations has been used extensively.

However, within the last decade or so there have been two new developments:

1) the ability to manipulate DNA and to introduce what have been aptly called 'designer genes' into organisms and to get these genes expressed to make useful products;
2) the ability to fuse cells and produce monoclonal antibodies.

These techniques are creating new combinations of genes – combinations unimagined just a few years ago. They have created enormous opportunities for commercial exploitation but, if you pay attention to the media, you will realize they have also created public concern for both the environment and the workplace.

At this workshop we have a selection of speakers from labour, management, science and government, who, we hope, will give us a clear and relatively complete perspective of the field. This information will serve as the basis for council's deliberations in the coming months to help determine the advice council should give to the Ministry of Labour on whether or not there is a need for regulation in this area and, if so, what form that regulation should take.

I welcome you all and thank our speakers for their participation.

OPENING ADDRESS – DR. MUSTARD

DR. McCALLA

Let me introduce the first speaker. Dr. Fraser Mustard is no stranger to the advisory council members since he was our former chairman.

Dr. Mustard has had a distinguished career as a medical scientist, has been dean and vice-president of Health Sciences at McMaster University, and is currently president of the Canadian Institute for Advanced Research.

He comes to us today in his capacity as a technology watcher. He was a member of the Royal Commission on Asbestos and is very much concerned about the occupational hazards of various substances and technologies. He is going to set the stage by offering us some of his thoughts.

DR. MUSTARD

It is a pleasure to be back amongst the members of the advisory council and the Ministry of Labour, where I was engaged in the attempts to solve contentious problems. I am delighted to see that you have now solved all the problems since you have a new chairman of the advisory council – at least, that's the rumour I hear.

As I know very little about biotechnology, I would like to reflect about how we learn about agents that affect health and how we tackle this problem. There are lessons from the past, and Ontario has its own powerful lesson, which is the asbestos story.

Having had the opportunity to sit through what was, for me, a world-class science court (and a seminar on this complex health issue) as a member of the Royal Commission on Asbestos, I thought it would be useful to review some of the lessons from that experience and examine what the knowledge means in relation to future approaches to health hazards. Obviously, a key objective is to reduce the risk of exposing individuals to hazardous substances by identifying the dangerous substances before they have had extensive use.

A second point is that, when the health effects of a substance are found after it has had extensive use, we may be slow in reacting to the situation, and then the reaction that takes place in society may be far greater than what is really necessary in terms of the problem. This has implications in a new venture such as biotechnology in terms of what you can and cannot do.

The Asbestos Story

Slide 1

I will now briefly outline some points from the asbestos story. Most of you are aware that asbestos has been used for a long time. The Romans had an interesting use for asbestos. They made tablecloths of it and they would throw the tablecloth in the fire to clean it for future use. For those of you who do not like laundering, or would like reusable picnic cloths, this idea might be of value.

The modern use of asbestos starts about 1880, and it is interesting that up until 1930 only five million tons were mined. In 1973 six million tons were mined in the world. The enormous increase in the use of asbestos occurs in the middle part of this century. However, the identification of the possible harmful effects begins earlier in this century.

Slide 2

Its use in society was widespread and occurred long before there was regulation in relation to the health effects of asbestos.

Slide 3

Health Effects of Asbestos

Evidence concerning the possible health effects of asbestos was available by 1910. There was evidence by the end of the 1920s of concerns about the effects of asbestos on the health of people who are exposed to it, particularly in relation to pulmonary fibrosis.

Slide 4

There were scattered reports in the '30s suggesting a relationship between asbestos exposure and cancer, and by 1947 much stronger evidence emerged. By the 1950s the evidence concerning the relationship between asbestos and cancer was well established. The evolving story of the health effects of asbestos could be considered to be completed with the demonstration that asbestos exposure was closely associated with the development of mesothelioma.

Slide 5

Regulatory Aspects

A mining act in 1912 suggested dust is bad for you, but did not have much application to asbestos use in Ontario. In Ontario it was not until 1947 that the Ministry of Health, which then had the responsibility for occupational health, proposed a non-enforceable threshold limit for asbestos fibres. Obviously, awareness of the health effects of asbestos was beginning to penetrate into the public sector. The *Construction Safety Act* in 1973 had strict regulations for asbestos spray used in insulation work. Remember, by 1972 and 1973, the understanding of the health effects of asbestos had become pretty sophisticated, so the regulatory process lagged considerably behind the knowledge base that had evolved. Some of the slowness in response was, of course, due to our society's indecision about whether government should intervene to enforce responsibility for protecting the health of workers when individual firms failed to do so.

Slide 6

Johns-Manville started their asbestos cement pipe production in Scarborough in 1948, asbestos cement board in 1955 and asbestos insulation in 1960. They opened this plant at a time when the effects of asbestos fibres on human health were recognized, so we had the beginning of widespread use of asbestos in Ontario at a time when there was already considerable knowledge about the health effects of the substance. You will remember from the previous data that regulatory process was weak at this stage, so the only organization that could have done anything about the potential problem in the 1950s was the company and only if they had understood the health effects data and were willing to act upon that knowledge. The company did not act for reasons that are not clear. If there had been sufficient action to protect the asbestos workers at the Johns-Manville plant, there would not have been a royal commission; but instead, Ontario had a world-class example of a public health epidemic in the workplace.

Slide 7

The story of asbestos really shows us some of the problems in hazard identification. We learned a similar lesson with vinyl chloride and other agents. Why was industry so slow to respond? Can industry develop an awareness and a commitment to tackle the problems long before they become a health issue? If this can be done, what kind of regulatory process is needed? The concerns about potential (real or otherwise) biotechnology hazards are creating demands for some type of pre-use screening: that is, identify the potential health risks before use rather than after use. Can it be done? Should it be done?

Slide 8

When one considers the magnitude of the Johns-Manville story, I think most would agree that a mechanism for pre-use assessment of risk is desirable. There were 186 asbestos production workers hired before 1960: of these, 56 died – 20 with lung cancer and 10 with mesotheliomas. That is a very high incidence, i.e. the mortality rate for those people hired before 1960 was four times the expected; lung cancer was five times the expected and cancer of the gastro-intestinal tract three times the expected.

Slide 9

Compensation

The next part of this story is the question of compensation. In our society we operate with the principle that if you are inadvertently injured or exposed to something in the workplace, you should receive compensation.

Slide 10

Compensation for injuries is relatively easy. I say 'relatively' because there are problems – but most people know when they are injured. There is usually someone who observes it, and it is very easy to relate the injury to the workplace. But for health effects it is very difficult. For instance, lung cancer can be caused by many things, of which asbestos is only one. Generally speaking, compensation depends on attributing the workplace exposure as the cause of the health effect. This is extraordinarily difficult. Hence the situation becomes one where, after a long latency between exposure and the development of the health effects, the worker has to prove the case. This is a totally different philosophy from that for accidents. For accidents workers do not have to prove the case. The evidence is there and the compensation is automatic. Hence there is a controversy about how to apply our compensation plan for health effects where the problems of attribution are very difficult. The Weiler Report said you should simply compensate automatically and not try to determine cause. A method for identifying hazardous substances before widespread use could substantially reduce this kind of compensation problem.

Slide 11
Is asbestos harmful?
The third point that comes out of the asbestos story is the question 'Is asbestos harmful?' One of the things that became apparent as we listened to the evidence was that, although we were talking about asbestos fibres, we were mostly talking about fibres of a certain dimension. Experimentally in animals you could produce the same disease process by using glass fibres of exactly the same dimension as asbestos fibres. Fibres larger or smaller than this size had little effect.

Slide 12
As we proceeded through the tons of epidemiological data and interviewed all kinds of people, we began to recognize that with certain kinds of asbestos use there was little to no detectable disease. In other words, in some situations where asbestos is used there appears to be little or no risk.

Slide 13
The particle dimensions appear to be related to how the different fibres fragment.

Slide 14
The commission came to a conclusion that asbestos use in insulation and the manufacture of textiles were enormously hazardous. If you think of the process and the distribution of fibre size, it is no wonder the processes used to make these materials were hazardous.

Curiously enough, cement pipe was a low to moderate hazard. It was a severe hazard in Scarborough, but it was not much of a hazard down in New Orleans. We have often wondered if this was related to the humidity, the more open plants in the South, the particle size distribution or the way the pipe was produced.

Brake lining manufacture with asbestos was a relatively low hazard. Mining and milling, using modern techniques, has a very, very low risk to the health of workers. With what we know today, it is very probable that asbestos could be used with no greater risk to the population than driving a car to and from work.

If the cabin of the Air Canada aircraft that caught fire flying from Dallas to Toronto a couple of years ago had had asbestos in much of the interior material, the fire hazard for the aircraft would probably have been minimal. However, our emotional response to the asbestos story has prevented us from taking a more objective look at its possible use.

Failure to identify hazardous substances early and use them intelligently leads to a series of downstream effects which carry far beyond the workplace. In my view, and I think my fellow commissioners would agree, asbestos could probably be used safely in society provided we address the question of particle size and fragmentation and control use to avoid exposing people to the hazardous particles.

If you go through the asbestos mills in Quebec today, you will find the milling operation is done under negative pressure with no workers directly involved. The mills have sophisticated ways for handling asbestos that are fully automated, avoiding the risk of exposing individuals to hazardous asbestos fibres.

Slide 15

Lessons to be Learned

It seems that there are three lessons. Firstly, hazard identification and regulation. Obviously, it is not desirable to keep the old system. Secondly, compensation to the work force. This problem is created by the inability to recognize a potential hazard. Thirdly, how to avoid the situations where failure to recognize and regulate a hazard causes a barrier to the intelligent use of a material or a substance in society.

It is obvious we need new systems. This is important for biotechnology because there is a fear about biotechnology that is somewhat similar to the concerns about radiation. 'Those manipulated strands of DNA may replicate themselves and take over the world.' 'They may do something to me.' 'You may create something that makes me sick, both in my workplace and the environment because it can get free in the population.' Therefore, a new system needs to have pre-screening, i.e. identification of the potentially hazardous effects of the substance. This can be done. An important question is, once this has been done, how do you regulate a potentially hazardous substance?

It is interesting to note that industry seems to be split on this issue. Industries in countries where there are heavy liabilities for producing something that causes health effects have developed processes of their own for identifying the potential hazards of a substance. If something is thought to be toxic, the companies are requiring that users be aware of the toxicity and that they demonstrate that the substance will be used at minimum risk to the work force. Obviously, this procedure provides a company with a defence against a downstream liability for introducing something into use that turns out to be hazardous to society. This approach may not be appropriate for our society, but it illustrates the kind of approach that can be developed if we want to avoid repeats of the asbestos story.

Most would now accept the philosophy that corporations have a responsibility to avoid exposing workers to hazardous substances and inappropriately placing hazardous material in the marketplace.

Slide 16

What Lies Ahead

Slide Number 16 is about artificial intelligence and robotics. As a technology watcher, I am involved in this technology. If you draw that field as a huge circle, down at the bottom is a little hatched area where it says 'Rule-Based Expert Systems'. Rule-based expert systems are the beginnings of the application of artificial intelligence in society. They are involved in offices; they are involved in manufacturing; but the main impact comes when the next application occurs. You will notice the item in the centre called 'Vision Sensate Systems'. It is difficult to predict the pulls that exist in society today for technology development. It is highly probable that within 25 years there will be systems that can see and act. This means that there will be the technological capability to fully automate almost any mining or manufacturing process if companies (society) are prepared to do it.

I do not want to get into the broader implications of the changes in the nature of work that this would cause, but to point out that advanced technology, e.g. smart robots, coupled with the capacity to recognize hazardous substances, could remove the risk of exposing workers to potentially hazardous substances. The asbestos operation in Quebec is beginning to apply this technology. The safe use of vinyl chloride in the workplace involves the use of advanced technology.

Hence, in this case, there is the technological capacity to minimize the risks in the workplace to virtually zero. Now you will say 'The cost is going to be exorbitant.' It is important to remember the cost of computers keeps decreasing at about 40 per cent a year and it is still going down at that rate, so a relatively low-cost technological capability to automate is probably going to emerge. However, whether we will want to become engaged in it, i.e. application of the capability, is a totally different question.

The important issue facing us at a conference like this is 'Is it justifiable, with our knowledge base, to leave the identification and use of hazardous substances the way they were in the past?' Assuming that it is not justifiable, the next question is how can you pre-identify potential hazards? It is not an easy task; however, the potential for developing such a capability, as this council has pointed out, is considerable compared to what it was 20 years ago or even 10 years ago.

Those of you on the advisory council have gone through the agonizing and tedious task of learning about how you can identify things which are carcinogens. Given that that information can be developed and identified in any jurisdiction, it raises the question of how much linkage and sharing of hazard information on new substances should there be amongst constituencies. Does a company in Ontario have to screen something that has already been carefully screened in another jurisdiction? It seems to me that, in a global society, there has to be some standardization of approach to the development and distribution of the information.

To Regulate or Not to Regulate

Assuming that you have the skill to recognize things that are potentially hazardous, both in the workplace and in the environment, the next issue is regulation. Should regulations be developed for everything? How do you develop a regulation for a possible hazardous substance when you have no idea of the effects of human exposure? Earlier I suggested that, in the workplace, if something is perceived to be hazardous, there probably will be a technology available to automate and control the processing of the material with close to zero exposure for workers. As you may be aware, there are new factories that are operated with very few humans in the plant. That is the principle used in some of the asbestos mills in Quebec at the moment. This is one possible approach.

This approach assumes that you adopt a strategy of zero exposure to anything which is a potential hazard. Should that be the approach? What is the cost to society in terms of employment, ability to manufacture products for sale throughout the world and our overall standard of living?

The question of how we control hazardous substances in society is now an extraordinarily complicated and complex problem. There are additional problems that come up when you consider biologically-produced material like those to reduce the risk of crops from freezing. As you know, in the United States Rifkin has had a battle going with the companies and the government because he claims that the release of such substances will create all kinds of other adverse effects in society. The problems are so substantive that I do not believe that they should be solved within a single jurisdiction such as the province of Ontario. Biological substances tend not to just stay in one domain. They will go into other domains, over to New York state from Ontario, etc. The principles for dealing with such problems need to be established. They need to take into account the nature of the potential risks and the potential spread. They need to be done intelligently with a firm objective analysis of the evidence rather than based on emotional rhetoric.

The key to the future in respect to hazardous substances lies with sophisticated identification and understanding before using materials. I think the challenge to all of you in this meeting is 'Can you create a format or formats for developing approaches in this direction which are workable, which are accountable and which are efficient?' And with that, Mr. Chairman, I will finish and be happy to answer questions.

J. F. Mustard

Slide 1

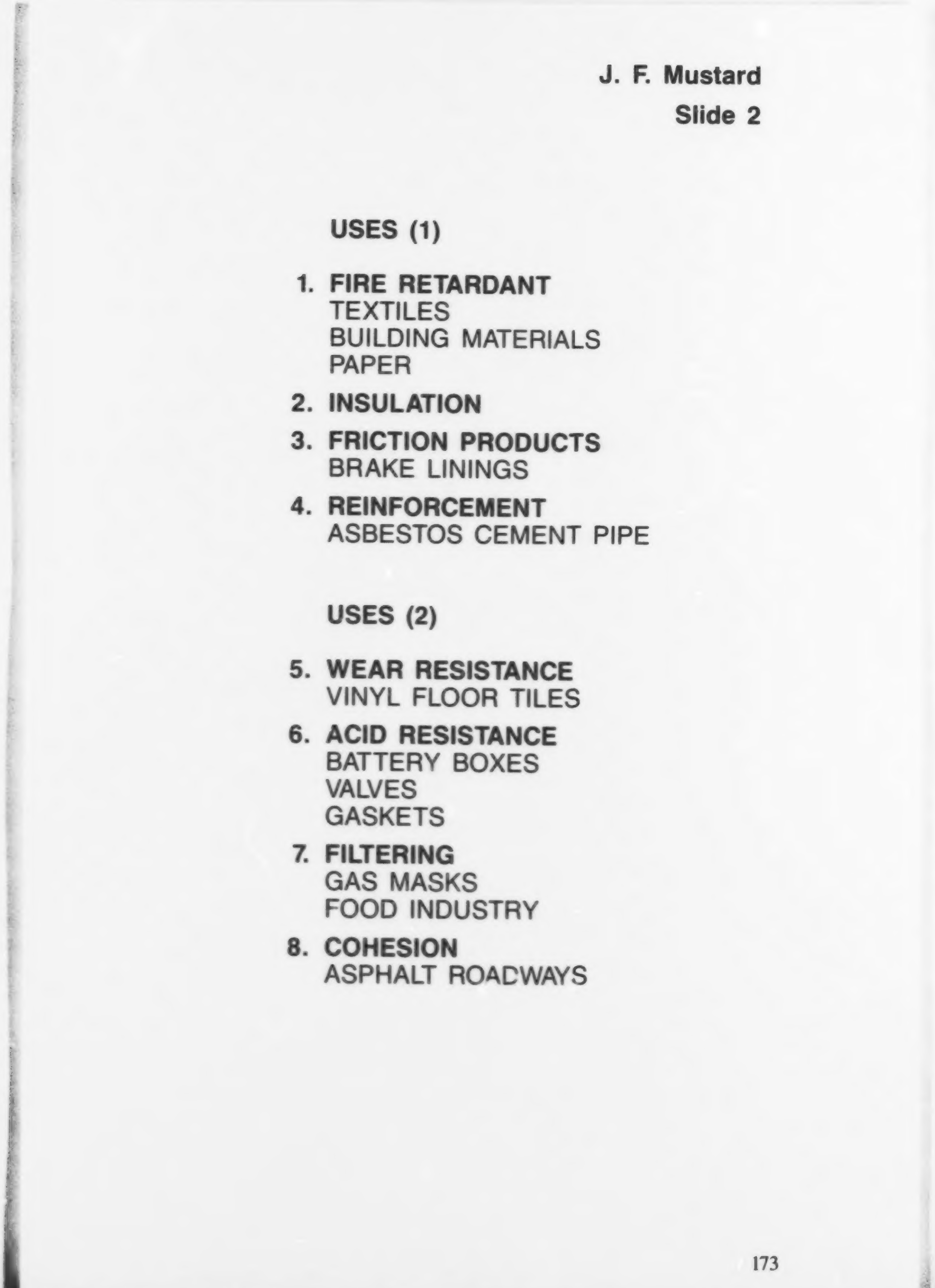
ASBESTOS USE

STONE AGE
- STRENGTHEN CLAY POTTERY

ROMAN ERA
- FIRE PROOF FABRICS

MODERN USE
- BEGINS ABOUT 1880

1880-1930 – 5 MILLION TONS MINED
1973 – 6 MILLION TONS MINED



J. F. Mustard
Slide 2

USES (1)

1. **FIRE RETARDANT**
   TEXTILES
   BUILDING MATERIALS
   PAPER
2. **INSULATION**
3. **FRICTION PRODUCTS**
   BRAKE LININGS
4. **REINFORCEMENT**
   ASBESTOS CEMENT PIPE

USES (2)

5. **WEAR RESISTANCE**
   VINYL FLOOR TILES
6. **ACID RESISTANCE**
   BATTERY BOXES
   VALVES
   GASKETS
7. **FILTERING**
   GAS MASKS
   FOOD INDUSTRY
8. **COHESION**
   ASPHALT ROADWAYS

J. F. Mustard

Slide 3

RECOGNITION OF ASBESTOS HEALTH EFFECTS (1)

1906	**AURIBAULT – FRANCE** EXCESS DEATHS AMONG WEAVERS
1907	**MONTAGUE MURRAY** REPORTED FIBROSIS DUE TO ASBESTOS EXPOSURE
1924-27	**W.E. COOKE** ASBESTOS EXPOSURE AND FIBROSIS – 'ASBESTOSIS'
1928-29	**BRITISH STUDY** 1930 REPORT – ASBESTOS EXPOSURE CAUSES SERIOUS PULMONARY FIBROSIS

J. F. Mustard

Slide 4

RECOGNITION OF ASBESTOS HEALTH EFFECTS (2)

1930's	A NUMBER OF STUDIES SHOWING ASBESTOSIS SECONDARY TO ASBESTOS EXPOSURE
1930's	SCATTERED REPORTS RELATING LUNG CANCER TO ASBESTOS EXPOSURE
1947	**CHIEF INSPECTOR OF FACTORIES** (BRITAIN) LUNG CANCER IN SUBJECTS WHO DIE FROM ASBESTOSIS 13 X EXPECTED
1955	**R. DOLL, G. BRITAIN** EPIDEMIOLOGICAL EVIDENCE OF INCREASED RISK OF LUNG CANCER – ASBESTOS TEXTILES
1960's	MANY STUDIES CONFIRMED R. DOLL'S FINDINGS

J. F. Mustard

Slide 5

ASBESTOS REGULATION IN ONTARIO

- 1912 **MINING ACT**
  REMOVE DUST INJURIOUS TO HEALTH
  - NO EXPOSURE LIMITS
  - DID NOT APPLY TO CONSTRUCTION
- 1947 **MINISTRY OF HEALTH**
  PROPOSED ASBESTOS THRESHOLD
  LIMIT OF 5 MPPCF
  NOT ENFORCEABLE
- 1962 **CONSTRUCTION SAFETY ACT**
  1973 – STRICT REGULATION FOR
  ASBESTOS SPRAY
- 1973 **MINISTRY OF HEALTH**
  ADOPTED TLV OF 2 FIBRES/CC
- 1982 **MINISTRY OF LABOUR** (OCCUPATIONAL
  HEALTH AND SAFETY ACT, 1978)
  - REGULATED ASBESTOS EXPOSURE

J. F. Mustard

Slide 6

JOHNS MANVILLE PLANT - SCARBOROUGH

1948 - STARTED ASBESTOS CEMENT PIPE (ACP) PLANT

1955 - STARTED MAKING ASBESTOS CEMENT BOARD (ACB)

1960 - ASBESTOS INSULATION (AI)

DISCONTINUED ACB 1970 AND ACP AND AI 1980

J. F. Mustard
Slide 7

STORY

- DEMONSTRATES THE PROCESS OF HAZARD IDENTIFICATION
- SLOWNESS OF INDUSTRY RESPONSE
- SLOWNESS OF REGULATORY RESPONSE

J. F. Mustard

Slide 8

JOHNS MANVILLE PLANT AND ASBESTOS RELATED DISEASE

- NEARLY 50% OF ALLOWED DEATH CLAIMS COME FROM THIS PLANT
- 186 ASBESTOS PRODUCTION WORKERS HIRED BEFORE 1960
  - 56 DEATHS
  - 20 – LUNG CANCER
  - 10 – MESOTHELIOMA
- FOR ALL WORKERS HIRED BEFORE 1960

MORTALITY	4 TIMES EXPECTED
LUNG CANCER	5 TIMES EXPECTED
G.I. CANCER	3 TIMES EXPECTED

J. F. Mustard
Slide 9

COMPENSATION

ACCIDENTS VS DISEASE

NO FAULT POLICY

J. F. Mustard

Slide 10

ATTRIBUTION

ACCIDENTS AND WORK PLACE
- MINIMAL PROBLEM

DISEASE WITH LATENCY
- PROBLEM OF IDENTIFICATION AND RECOGNITION
- PROBLEM OF PROOF

J. F. Mustard

Slide 11

IS ALL ASBESTOS HARMFUL?

- PRIMARILY RESPIRABLE FIBRES OF A CERTAIN SIZE
- GLASS FIBRES OF THE SAME SIZE CAUSE SIMILAR DISEASES IN EXPERIMENTAL ANIMALS
- LOW TO UNDETECTABLE DISEASE WITH CERTAIN TYPES OF ASBESTOS USE

J. F. Mustard
Slide 12

OBSERVATIONS (1)

- DOSE RESPONSE RELATIONSHIP
- INHALATION MOST HAZARDOUS
- LONG THIN FIBRES DANGEROUS
- CHRYSOTILE MORE HAZARDOUS THAN CROCIDOLITE AND AMOSITE
- FIBRE DIMENSION A PRODUCT OF FIBRE TYPE AND PROCESS

J. F. Mustard

Slide 13

CHRYSOTILE

- TINY FIBRES
- SPIRALLY WOUND TUBE
- FIBRES SEPARATE EASILY INTO FIBRILS

CROCIDOLITE

- STRAIGHT OR ROD LIKE
- BRITTLE AND BREAK MORE READILY THAN CHRYSOTILE
- 'DUSTIER' THAN CHRYSOTILE

J. F. Mustard

Slide 14

MANUFACTURING PROCESS

- INSULATION AND TEXTILES
  VERY HAZARDOUS
- CEMENT PIPE
  LOW TO MODERATE HAZARD
- BRAKE LININGS
  LOW HAZARD
- MINING (CHRYSOTILE)
  LOW HAZARD

J. F. Mustard

Slide 15

FUTURE

- KEEP OLD SYSTEM
- DEVELOP NEW SYSTEM
  - PRE-SCREENING?
  - REGULATION?

J. F. Mustard

Slide 16

ADVANCED TECHNOLOGY 'SMART' ROBOTS

- REDUCE WORK IN HAZARDOUS AREAS
- DECREASE NEED TO EXPOSE INDIVIDUALS TO CARCINOGENS

ISSUES, BENEFITS AND RISKS

SCIENCE AND DEVELOPMENT – DR. SLOTIN

DR. McCALLA

Our second speaker is Dr. Lewis Slotin of the Medical Research Council, who is going to talk to us about the science and developmental issues involved in biotechnology.

Dr. Slotin was born in Winnipeg and educated as a biochemist. He worked as a researcher for a number of years at the National Research Council and in 1977 became policy adviser with the Ministry of State for Science and Technology. He has been secretary of the Federal Task Force on Biotechnology and developed the subsequent national strategy for biotechnology which was adopted by the government in May of 1983. He is currently a director of the Program Branch of the Medical Research Council, responsible for management of all the council's extra-mural research programs, and has continued with his membership on the National Biotechnology Advisory Council.

Dr. Slotin, it is a pleasure to invite you to address us.

DR. SLOTIN

Thank you, Mr. Chairman. At the outset may I express my thanks to the council for the privilege of attending and participating in this workshop?

I was asked to describe, in a few minutes, what biotechnology is and what opportunities it presents.

There are numerous definitions of biotechnology, and I do not intend to list or debate the nuances between them. For this gathering I believe it is important to understand that biotechnology today is a series of tools which have enormous applicability in the future production of goods and services. These tools, with names as exotic as genetic engineering, cell fusion, recombinant DNA, enzyme systems, cell cultures and fermentation, have emerged from an explosion of knowledge over the past 10-15 years in disciplines such as genetics, biochemistry, cell and molecular biology, microbiology, immunology and biochemical engineering. It is this new scientific base which is providing the tools to permit society to explore the use of biological systems in manufacturing at levels undreamt of only a few years ago.

It is important to remember two things about the biotechnology revolution which now faces us:

First, the applications of biotechnology will change the nature of existing industries and result in the birth of new firms. Traditional products and services as well as new ones will be produced through bioprocessing. So one must expect the very real likelihood that established industrial/manufacturing processes will soon incorporate some form of biological processing with little, if any, change in the final marketed product.

Second, traditional bioprocessing, such as in the food and beverage industries, pharmaceuticals and some fine chemicals, will expand enormously, but new directions will also be felt in health care, agriculture, mining, forestry, bulk chemicals, fisheries and waste treatment. Thus, while the biology business has been around for centuries (wine, cheese, beer, etc.) the new tools of biotechnology will increase by many orders of magnitude the world's industrial dependence on bioprocessing.

Before turning to the opportunities presented by biotechnology I would like to say a few words about why one might select a biological process rather than a chemical or mechanical process in terms of industrial strategy. The first reason is that biological processing is far less energy intensive. The second is that the raw material for biological processes is carbohydrate, which is renewable. The third reason is that biological processing may be less harmful to the environment and will, in fact, greatly improve the natural decomposition of waste and toxic materials which result from other industrial processes.

It is often said that the range of opportunities presented by biotechnology are limited only by the imaginations of those who pursue it. In presenting the following to you I make no statements about the time frames nor eventual commercial predictability. Biotechnology is still in its infancy, and there are many developments still to come. The level of interest and investment world-wide is proof positive, however, that the major impact of biotechnology is not far off.

A. The first area of impact I would like to describe is Food and Agriculture. As the world population grows, agriculture will need to provide more and more food. Biotechnology may yield methods and products that improve agriculture in many ways. In animal agriculture, biotechnology offers promise in the following areas:

(a) diagnosis, prevention and control of animal diseases. Diagnostic kits based on monoclonal antibody technology are being developed to assist in the better detection of animal viral, bacterial, protozoan and parasitic infections. Animal vaccines are also being explored to combat a variety of animal viruses including rabies and foot and mouth disease. Bacterial and parasitic infections may also benefit from vaccine development arising from biotechnology, but another benefit will also be the increased understanding of the mechanisms of drug resistance, thus enabling new directions to be pursued in the development of anti-infectants.

(b) animal nutrition and growth promotion. The use of growth hormones and feed additives to improve animal feed usage and animal health will be enhanced through biotechnology. Both improved supply and purity will increase both usage and understanding of these materials.

(c) genetic improvement of animal breeds. As a result of increased knowledge due to biotechnology, the identification of genes and gene products that influence characteristics of productivity, vigour and disease resistance may be possible.

In addition to the potential applications of biotechnology in animal agriculture, there are several potential applications in the area of crop improvement. These are:

(i) the manipulation of genes that confer resistance to plant disease and insects; that permit the growth of plants in environments of low moisture, high salt, frost, etc.; that increase the amount and quality of plant products such as seeds, flavourings, dyestuffs, pharmaceuticals, etc.; and that enhance plant growth through improvements in the photosynthetic mechanism; and

(ii) to modify micro-organisms to enhance the fixation of nitrogen, thereby reducing the dependence upon petroleum- based fertilizers; to produce more specific and environmentally acceptable insecticides; and to suppress disease and promote growth through changes in soil conditions (pH, iron, salt).

It should be noted that many of the crop improvement opportunities I have just described are applicable in forestry also. These opportunities, coupled with those described under commodity chemicals should be considered as the range of possibilities which biotechnology presents in the forestry sector.

B. The second area of application of biotechnology is specialty chemicals. A number of specialty chemicals, including some vitamins, fatty acids and steroids, are presently produced through chemical synthesis. Current chemical synthesis production processes often require large energy inputs, have complicated stages in synthesis and yield many by-products. Potentially, through biotechnology and the utilization of enzymes, some of the steps in current syntheses could be altered or even eliminated.

Finally, it should be noted that there are some specialty chemicals synthesized in nature, such as complex polysaccarides and other biopolymers used as thickening agents, aggregating agents and lubricants, for which chemical synthesis is not feasible. Improving the production of these specialty chemicals in controlled bioprocesses is beginning to be investigated.

C. The third area is commodity chemicals and energy production. Practically all commodity chemicals are currently made from petroleum and natural gas resources and are used as precursors for a variety of materials, such as polymers and solvents. Biomass – including crop and forest product wastes and municipal and agricultural wastes – may provide solutions to some of the long-term problems associated with chemical and energy production. It is believed to be technologically possible to produce essentially all commodity chemicals from biomass feedstocks, such as starch or cellulose, and most commodity chemicals can be synthesized biologically. The commodity chemicals that are attractive targets for production from biomass via bioprocessing possibly mixed with traditional processing include ethanol, acetone, isopropanol, acetic and citric acids, butanol, lactic and levulinic acids.

Because the chemical composition of biomass differs from that of petroleum and because bioprocessing may provide an enormous range of possibilities, it may be that the most important commodity chemicals produced from biomass will be not chemicals that directly substitute for petrochemicals, but other chemicals that, together, define a new structure for the chemical industry.

D. The fourth area of impact of biotechnology may be loosely defined as environmental applications. Micro-organisms have several uses in the environment, and biotechnology can potentially be used to enhance their utility. One application is in the control of pollution and treatment of toxic wastes. Traditional approaches to waste water treatment will be enhanced through biotechnology. Examples include solids separation or flocculation using biologically derived flocculants; sludge dewatering using enzyme combinations; removal of naturally occurring organic micropollutants (phenolic compounds) from drinking water using microbially produced enzymes.

Heavy metals such as lead, zinc, copper, cadmium and iron in drinking water have long been of concern. The production of specific proteins which have a high affinity for these metals and can therefore be used in metal extraction is currently being explored through biotechnology.

Toxic waste treatment has also been approached through the modification or amplification of certain micro-organisms which occur naturally. Applications in this area include detoxification of pesticides and herbicides, degradation of polyhalogenated aromatics, slime control and the decomposition of grease accumulations.

The mining industry is one which is already benefiting from biotechnology and is expected to increase in the future. Copper and uranium are recoverable from mine dumps using biological processes and coupled with silver, cadmium, zinc and mercury can be recovered from dilute solutions. On the horizon is concentrate leaching using micro-organisms as alternatives to the highly energy intensive and polluting smelting processes currently employed.

A third environmental application of biotechnology is in enhanced oil recovery. About 50 per cent of the world's subterranean oil is either reserves trapped in rock or is too viscous to pump. Currently under investigation is the development of micro-organisms or microbially produced compounds which could be injected into oil wells to displace or make more readily accessible trapped oil.

E. The last but not least area of application is human health. On a global basis, perhaps one of the most important applications of biotechnology is to facilitate further biomedical research. Among the most intriguing areas of research using biotechnology are those pertaining to the nervous system, the immune system, the endocrine system and cancer. As research in these areas yields insight into mechanisms of disease and healthy body function, basic questions about the organization and function of the brain, the nature of behaviour and the regulation of body functions may be answered. The illumination of these phenomena in turn may generate new possibilities for health care products.

Health care product production may be improved with biotechnology in many ways. The first is the production of large amounts of materials which are otherwise scarce. Insulin, human growth hormone, interferon and other regulatory proteins, blood products and neuroactive peptides are part of this group.

Second is the production of products such as antibiotics which were previously unavailable, produced by chemical synthesis or conventional fermentation. Penicillins, tetracyclines and cephalosporins are some examples here.

Third is the production of a whole range of highly specific, non-infective vaccines against a range of viral, bacterial and parasitic diseases. Influenza, herpes, venereal diseases, salmonella, malaria and schistosomiasis are a few examples.

Finally, with the advent of monoclonal antibody technology has come a new chapter in the diagnosis of disease. Diagnostic kits are presently being developed for venereal diseases, hepatitis B and other viral infections, bacterial infections, pregnancy testing and cancer detection. The next generation of monoclonal antibodies will find utility in radiolabelled *in vivo* diagnostics as well as drug monoclonal cocktails with which to identify, target and destroy specified cells.

I hope in the last few minutes I have given you some idea of what the biotechnology revolution may represent. It will be in old businesses and new. It will require both traditional and innovative approaches. It will create opportunities; it will create problems. But, overall, it cannot be ignored.

INDUSTRY PERSPECTIVE – DR. GOLDHAMMER

DR. McCALLA

The next speaker is Dr. Alan Goldhammer, who is presently Associate for Technical Affairs at the Industrial Biotechnology Association in the United States. In his role there he concentrates on regulatory and scientific matters. He was trained as a chemist and biologist. After doing post-doctoral research he worked at the National Institute of Health in the United States for five years before joining the Industrial Biotechnology Association.

DR. GOLDHAMMER

I would like to thank the organizers of the symposium for inviting me to speak and give industry's perspective of biotechnology.

Last week, in the United States, we reached a milestone with the first approval of a drug which was produced by a new biotechnology company. It was a human growth hormone manufactured by recombinant DNA technology by the start-up firm Genentech. Earlier, they had pioneered the technology with the cloning of the human insulin gene, but licensed the production of insulin to Eli Lilly. So, with this milestone, I think that the industry is coming of age and we hope that the time frame for product introduction that was commented on by the last speaker will be somewhat shortened as the months roll by.

First I would like to say a couple of things about the Industrial Biotechnology Association. As Dr. McCalla pointed out, we are a Washington-based trade association. We have 48 member companies, who have interests in chemicals, pharmaceuticals and agriculture. One of our member companies, Allelix, is based in Mississauga. I notice Dr. Evans, president of Allelix, is chairman of the round table discussion this afternoon.

As an industrial trade association we represent the industry to government and regulatory groups. We also have a public affairs function. As an example the association has developed three publications. Two of these, one on interferon, one, a glossary of biotechnology terms, are free. The third is a primer pamphlet on 'What is Biotechnology?' priced at $3.00 (to cover printing costs).

Part of what I had planned to talk about was covered by the previous speaker. However, I will quickly review some examples of the opportunities which biotechnology firms can commercialize. In Slide 1 these are divided into broad groups. The first category is human health. Much of the early industrial emphasis was concentrated in this area because the products were easy to identify and, in most cases, they could not be made by other processes. Generally, it is far too difficult to chemically synthesize complex proteins that are applicable to human health care. However, with the advances in genetic engineering it is now possible to clone and express a number of genes which code for proteins such as interferons, vaccines, etc.

There are three interferons that are presently being clinically tested for cancer treatment and inflammatory diseases:

Vaccines – hepatitis B vaccine is undergoing clinical testing. It is likely that a hepatitis vaccine, produced by recombinant DNA, will be approved for general use before the end of this year.

As I already pointed out, a human growth hormone has been approved in the United States.

There are a number of enzymes that are also presently undergoing clinical testing, e.g. urokinase, for the treatment of myocardial infarctions, etc. (See Slide 1.)

The second category is food, agriculture and horticulture. Probably the bulk of the biotechnology products at present is included in B1: enzymes for food processing, e.g. glucose isomerase is used for the production of high fructose corn syrup and is presently one of the most widely produced industrial enzymes in the world. In the United States high fructose corn syrup has virtually displaced cane sugar for use in soda pop. I will have more to say about some of the environmental uses in the discussion of the regulatory issues.

The third group is energy, raw materials, chemical and environmental management. I would agree with the comments by Dr. Murray Moo Young that a lot of these are not likely to be commercialized in the near term because they are competing with existing petro chemical processes. However, if costs can be brought down and engineering processes developed so that these could successfully compete with existing processes, they may be commercialized. However, biotechnology is widely used for the production of ethyl alcohol. Last year approximately 700 million gallons of ethyl alcohol was fermented from biomass sources, and with the switch from leaded to unleaded gasoline, alcohol is becoming accepted as an octane enhancer. This is one case where the biotechnological process is competitive with the petrochemical process and, in future, may displace it.

Regulatory Issues and Workplace Safety Issues

Slide 2 outlines the statutes that are applicable to commercial genetic engineering in the United States. These statutes can be classified into three groups: statutes that are applicable to products; to processes; and directly to the workplace.

The first is the *Federal Food, Drug and Cosmetic Act*, which is administered by the Food and Drug Administration. It governs any product that is used as a drug or a food additive, and I think it is safe to say that about 80 per cent of all the things that are being investigated by biotechnology firms in the United States are going to fall under the auspices of this regulatory agency.

The Public Health Service Act is infrequently used, but can be implemented in the case of outbreaks of serious diseases. There is the potential for it to be applicable to certain parts of the biotechnology sector.

In the third group, which directly deals with workplace exposure, is the *Occupational Safety and Health Act*, which, in the United States, is administered by the Occupational Safety and Health Administration (OSHA).

Recently, OSHA promulgated guidelines that will regulate the biotechnology industry.

The rest of the legislation listed on Slide 2 is all administered by the Environmental Protection Agency, and the two main ones are:

1) the *Federal Insecticide, Fungicide and Rodenticide Act*, which governs all pesticide development. This is a licensing statute. Any product that is going to be used for pesticidal purposes has to be licensed and has to undergo a great deal of scrutiny. The normal time frame from product design to commercial development is four to five years. This is the time needed to meet the various requirements of the Act.
2) the *Toxic Substance Control Act* (TOSCA) is used to regulate chemicals that do not fall under any other statute. It was designed by the U.S. Congress to be a catch-all statute so that anything that is not regulated by another agency or another act within EPA will be regulated under this act. Under TOSCA there is the requirement to file a pre-manufacture notice with the Environmental Protection Agency. The agency then has 90 days, which can be extended for another 90 days, to give approval to a company to manufacture the product. It is likely that there will be products of biotechnology that will come under this act, e.g. the use of enzymes or organisms for treating pollution or wastes.

Workplace Safety Issues

The main issue here is whether or not there is an intrinsic safety problem associated with biotechnological processes. There is a long history in the fermentation industry (production of beverages, wine and beer) and, recently, in the pharmaceutical industry (production of antibiotics and other medicinal compounds) which indicates the processes are safe. The biotechnology industry differs from the chemical industry in one very significant manner. Micro-organisms can be grown at moderate temperatures. They do not require high pressurized reactors. Hence the chances of major industrial accidents such as we have seen over the past year in Bhopal, India and in Institute, West Virginia, are not likely to occur with biotechnological processes. Chemical reactions using high temperatures and pressures can cause the rupture of containment facilities and pipes and serious safety problems.

The second thing that needs to be stressed is that the micro-organisms used for biotechnological processes are themselves safe. Since the advent of recombinant DNA technology in 1973, a great deal of time and effort has been spent by various regulatory authorities and the National Institute of Health trying to come up with organisms that are safe and that can be used safely both in the laboratory and in commercial production. It is likely that industry will only use a certain select number of these organisms, e.g. *E.coli* K12, *Bacillus subtilis* and the yeast *Saccharomyces cerevisiae*. In addition to the contained facilities that will be used to grow the organisms, the fact that the organisms do not colonize humans gives an added measure of safety. Hence the issue of concern is the product itself, i.e. is exposure to the product likely to cause problems? Most of these products are going to be proteins, antibiotics or vitamins. They are not going to be toxic chemicals per se. The tests that are presently prescribed by the various regulatory authorities for dermal contact exposure, inhalation exposure, etc. are likely to be applicable to the biotechnology products as well. I think that the toxicology that is in place can evaluate these products in a reasonable manner.

The biotechnology industry was a recent outgrowth of the discovery of the recombinant DNA techniques back in 1973. The first companies were formed in the mid-to-late 1970s. The scale-up of the technology has only really occurred in the last three to four years. Hence we do not really have any past experience on the use of recombinant organisms on an industrial level. However, I think we can look at the occupational exposure of laboratory workers in research institutions which have been using these techniques. Investigators in these institutions have been using recombinant DNA to clone and express genes for up to 10 years. A number of the genes used in research have raised serious questions, e.g. oncogenes, which have been implicated in cancer; the AIDS virus has been cloned and expressed. In fact, a diagnostic test for AIDS antibody will probably be on the market later this year. The manufacture of this test involves producing the AIDS viral protein (a small segment of the entire viral genome, and non-pathogenic) from a recombinant organism (new biotechnology) as opposed to growing the virus and inactivating it (conventional technology). Obviously, handling the live virus is more likely to present a risk than using biotechnology to produce the protein antigen.

I think there is a degree of safety associated with cloning these — what could be considered dangerous — genes into safe microorganisms.

Looking at these laboratory workers there have been no indications of health problems in them. Admittedly, 10 years' experience is insufficient for long-term surveillance. There are, however, good surveillance programs in place at all of our companies, and we have a standing safety committee at the IBA, which holds regular meetings to address this issue. We are in the process of compiling some of these data to create a good, sound, statistical foundation for the regulatory agencies to indicate how safe the industry is.

Environmental Issues

There is one issue that cannot be skirted and that is the use of micro-organisms directly in the environment. This presents problems because micro-organisms, as you all know, can grow. They can be carried from one site to another and then grow in that other site. Are these organisms safe to put in the environment?

The EPA has registered 13 microbial and viral pesticides for use in the United States. The one used most widely is *Bacillus thuringensis*, which is used to control gypsy moth infestations. Hundreds of thousands of gallons of live bacteria are being sprayed on forest areas in the States. So far, we have not had reports of associated health problems like those that people have alluded to with other traditional, chemically-based pesticides. Commercial biotechnology firms are attempting to modify, by genetic engineering, the biological pesticides so their host range can be expanded and/or their ability to survive in the environment can be increased. One of the problems with *Bacillus thuringensis* is that it is not very long-lived and frequent sprayings are usually needed.

There is a great deal of controversy in the industrial sector, the public sector and the regulatory sector about what should be done to oversee and/or control the release of biological pesticides. The approach that was taken in the United States, and industry agrees with this approach, is what could be characterized as a conservative approach, e.g. the field testing, which, for normal chemicals or chemical pesticides is allowed up to 10 acres, will not be allowed for genetically engineered microbial pesticides. It is too early and there are too many unknowns to routinely allow a free 10-acre limit for field testing. The Environmental Protection Agency must review every field test proposal. At present, they are reviewing eight field test proposals, and we expect that the first approval will be the 'ice-minus bacterium' ***Pseudomonas syringae***, to be used to control frost on certain crops. We are hoping that several others will be approved early next year so that they will be ready in time for testing in the next growing season. Thank you.

A. Goldhammer

Slide 1

SOME EXAMPLES OF APPLICATIONS OF GENETIC MANIPULATION IN BIOTECHNOLOGY

A. *HUMAN HEALTH*

1. Monoclonal antibodies (for purification techniques, assays, tissue typing, in vivo tumour location, clinical diagnosis, therapy including targeting of chemotherapeutic agents).
2. Interferon (possible use for cancer treatment, antiviral therapy, inflammatory diseases)
3. Vaccines (against e.g. hepatitis B, influenza, malaria, encephalitis, cholera, herpes, adenovirus)
4. Hormones (e.g. growth hormones, insulin, prolactin, relaxin, gastrin, erythropoietin, thrombopoietin, chorionic gonadotropin, menopausal gonadotropin, steroids).
5. Enzymes (e.g. urokinase, heparinase, alcohol dehydrogenase)
6. Other proteins (e.g. specific antigens, blood factor, albumin, antithrombin, fibronectin).
7. Improved and new antibiotics, drugs, vitamins.
8. Gene therapy for genetic diseases.

B. *FOOD, AGRICULTURE AND HORTICULTURE*

1. Enzymes (e.g. amylases, rennin, ß-galactosidase, invertase, glucose isomerase, pectinases).
2. Food additives (e.g. sweeteners, aromas, flavours, colouring matter, thickeners and stabilizers, vitamins, amino acids, antioxidants, preservatives, surfactants).
3. Additions for animal feed (e.g. new antibiotics).
4. Improved and new plant varieties (including enhanced yields, crops specifically designed for particular land use, genes for proteins such as casein introduced into carbohydrate predominant crops).
5. Pesticides and herbicides with increased specificity (e.g. use of *Bacillus thuringensis* products, *Verticillium*, Baculoviruses, parasitic nematodes, nematocides, protozoan pathogens, piperidine derivatives).
6. Vaccines (against e.g. diarrhoeal colibacillosis, foot and mouth).
7. Plant growth hormones (e.g. cytokinins).
8. Fertilizers, microbial nitrogen fixation and manipulation of symbionts.
9. Diagnostic reagents for plant and animal diseases.

C. *ENERGY, RAW MATERIALS, CHEMICALS AND ENVIRONMENTAL MANAGEMENT*

1. Biomass from chemicals, wastes, residues and fuel crops (including production of ethanol, methanol, methane and SCP).
2. Enhanced oil recovery (e.g. xanthan gum, surfactants).
3. Improved algal cultures for use in photobioreactors (production of e.g. carbohydrate, protein, lipids, hydrocarbons).
4. Hydrogen and carbon dioxide production.
5. Chemicals and solvents (acetic acid, adipic acid, butanol, isopropanol, acetone, furfural, glycerol, waxes, polymers, alkene oxides and glycols, lubricants).
6. Metal extraction (e.g. copper, uranium, nickel, zinc, lead) from low grade minerals and recovery of valuable metals (e.g. mercury, cobalt).
7. Decomposition and detoxification of chemicals (e.g. oil spills, Dalapon, pentachlorophenol).
8. Improved microbial systems for environmental control of air, water and soil.

A. Goldhammer

Slide 2

TABLE 36. – Statutes That Will Be Most Applicable to Commercial Genetic Engineering

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1. *Federal Food, Drug, and Cosmetic Act* (21 U.S.C. 301 et. seq.)
2. *Occupational Safety and Health Act* (29 U.S.C. 651 et. seq.)
3. *Toxic Substances Control Act* (15 U.S.C. 2601 et. seq.)
4. *Marine Protection, Research, and Sanctuaries Act* (33 U.S.C. 1401 et. seq.)
5. *Federal Water Pollution Control Act*, as amended by the *Clean Water Act* of 1977 (33 U.S.C. 1251 et. seq.)
6. The *Clean Air Act* (42 U.S.C. 7401 et. seq.)
7. *Hazardous Materials Transportation Act* (49 U.S.C. 1801 et seq.)
8. *Solid Waste Disposal Act*, as amended by the *Resource Conservation and Recovery Act* of 1976 (42 U.S.C. 6901 et. seq.)
9. *Public Health Service Act* (42 U.S.C. 201 et. seq.)
10. Federal *Insecticide, Fungicide, and Rodenticide Act* (7 U.S.C. 136 et. seq.)

Source: Office of Technology Assessment.

ETHICAL ISSUES AND SOCIETAL CONCERNS – JOE GILHOOLY

DR. McCALLA

I would like to start the second session and introduce the first speaker, Mr. Joe Gilhooly of the Law Reform Commission.

Mr. Gilhooly is a philosopher by training. He has been a consultant to the Law Reform Commission of Canada since 1982 and is currently drafting a study paper on the ethical issues in biotechnology for the commission. He is also a member of the commission's study group investigating the legal status of the foetus.

MR. GILHOOLY

I have been asked to speak on the ethical and social issues surrounding biotechnology. Before I begin to talk about the substantive issues involved in this topic, I would like to draw your attention to a finding in a report written by Arthur D. Little and submitted to the U.S. National Science Foundation in 1984.[1] One of the findings of this report was that ethical issues were judged to be of low priority. High priority items calling for immediate government action were the commercialization of biotechnology, federal support of basic research and further study on legislation and regulation affecting biotechnology.

There is a sense in which this judgement of low priority is correct. It is a truism in this area to point out that biotechnology has been with us for a long time. We do not see breweries with their large fermentation operations as raising any particularly strong socio/ethical issues unless we are talking about putting their product into corner stores and further corrupting the youth.

If, for example, the breweries were to develop a new and improved yeast strain, one with a slightly different genetic makeup, in order to make the brewing process more efficient, it will not generally be seen as a deeply divisive social issue. There will not be a great hue and cry for government regulations, prohibitions or further studies and enquiries. In this example, ethical issues are of such low priority as to be virtually non-existent.

The question naturally arises as to what ethical difference is involved where the improvement in the yeast has been accomplished through rDNA techniques as opposed to more conventional ways of improving efficiency. Before I go on to talk about whether there are any ethical differences, I would like to comment on the reasons why I think the Arthur Little report concluded that ethical issues were a low priority. I think that the judgement was based on two factors:

First, the most pointed ethical issues involved with biotechnology centre around some of the medical applications – gene therapy, the whole range of assisted birth technologies, such as surrogate motherhood, *in vitro* fertilization etc., as well as the human experimentation necessary to bring these developments into practice. In 1984 some of these developments were, and still are, a long way off in the future. Naturally, anything which will happen in the distant future is seen as of less importance than developments which are happening now and which require controversial decision making.

The other factor which might have exercised an influence on the judgement of low priority concerning biotechnology is that it does not yet have a significant commercial presence. Biotechnology companies are primarily research organizations, and we do not have biotechnology products from Connaught, Allelix or Genentech in our medicine cabinets and garden sheds. We have yet to see labour and safety disputes concerning biotechnology companies in the pages of our newspapers. In contrast to the pesticide and chemical manufacturers, there is little in the way of organized opposition to biotechnology. So that, in the sense in which ethical issues are broadly based social concerns complete with public interest groups, business and government pitted against one another, we cannot say that biotechnology has raised moral controversy. Viewed in this context, then, I think it is fair comment to claim that ethical issues are of low priority.

To return to my topic, there are two things which I would like to accomplish this morning. First, I will examine the arguments which have been advanced by critics of biotechnological development. These arguments are purportedly ethical in nature and they attempt to draw the conclusion that biotechnology should either not be developed or severely restrained. The second thing I would like to accomplish is to examine the issues surrounding uncertainty. Uncertainty is endemic in this field, indeed, it is virtually impossible to find an analysis of biotechnology which does not give prominent place to the problems of uncertainty, be this scientific, legislative, or ethical uncertainty. I will describe some of these uncertainties and attempt to draw out the implications which are relevant to decision-making on biotechnology.

First, the arguments against biotechnology. There are four different arguments which have been advanced to show that bio-technological development should be restrained.[2] The first of these arguments can be characterized as a 'Doomsday' or 'China syndrome' argument. It opens with the factual claim that there is some possibility that the use of rDNA organisms could lead to catastrophic results. Thus there is a non-zero probability that spraying ice minus bacteria on crops could disrupt the eco system or perhaps affect weather patterns. Alternatively, it has been argued that it is inevitable that genetically altered *E. Coli* bacteria used in industrial fermentors will escape and that these bacteria could colonize the human gut and create epidemic disease. Since there is some chance of disaster, it is alleged that we should avoid developing this field. The response to this kind of argument is to point out there is a non-zero probability that continued conventional work on epidemic diseases or the marketing of new drugs and pesticides involves a similar non-zero risk of catastrophe. The risk of catastrophe does not forbid present practices, and, therefore, there is no reason to suppose that it will justify forbidding continued biotechnological developments.

Another response to Doomsday arguments is to launch the following kind of counter argument. We can make the claim that there is a non-zero probability that failing to use biotechnology might lead to catastrophe. That is to say, unless we develop this technology we will be helpless to prevent widespread starvation due to a world food shortage or that failure to use this technology to produce new drugs which are essential to save lives will result in similar catastrophes. To sum up, equally repugnant scenarios can be advanced for either developing or not developing biotechnology. Both arguments are equally suspect.

The second argument turns around the claim that it is wrong or unnatural to cross species barriers and that biotechnology should be stopped just because it involves this kind of violation of nature. But consider the following point – if crossing species barriers led to the possibility of feeding the hungry or curing the sick with **no** negative side effects, it would be hard to see what is wrong about doing this. In fact, if there were no risk and there was the possibility of such great benefit, it would seem to be morally obligatory to cross the species barriers.

This brings me to a third point which has been made against bio technological development. It is often pointed out that biotechnology involves economic benefits on the one hand and, on the other, risks to human health and safety and that it is immoral to weigh human life against mere economic benefit. This is the standard objection to cost/benefit and risk/benefit determinations and applies to all hazard creation, not just that from biotechnology.

This kind of argument is not well stated. To begin with, it is impossible to avoid comparisons between economic values and safety values. Such things as speed limits, electrical codes and product safety standards all involve an implicit weighing of costs and lives. In the second place, the benefits of biotechnology are not exclusively economic. The new drugs or more nutritious and cheaper foodstuffs which can be achieved by using biotechnology are of direct benefit to human health and safety. Thus, in principle, it is possible to weigh health and safety benefits against health and safety risks, and if this balance is acceptable, straightforward economic benefits need not be factored in or given the priority they may have been given in the past.

The final argument against biotechnology is the dangerous knowledge argument. Because biotechnology can be put to military ends, for example, it should be stopped. This kind of argument is dubious because it can be applied to any technology. Computer technology can be used, or rather misused, to violate individual privacy; herbicides can be turned into military defoliants; and lasers can be turned into strategic defence initiatives. Misuse of technology is not unusual, but, by the same token, possible misuse can only justify measures directed against such misuse and does not justify measures which would curtail beneficial exploitation of the technology in question. I would conclude, then, that none of the popular arguments which one sees in the press carries sufficient moral weight to justify halting continued biotechnological development.

If none of the arguments just outlined is sustainable, does this mean that biotechnology can proceed unimpeded by 'low priority' ethical reservations? What I would like to address next are a number of value questions, all of which centre around uncertainty.

At this point in time the health hazards of useful recombinant biological agents and their products are conjectural. To the extent that there are genuine health risks, they will be borne by workers in biotechnology production facilities since they will be most likely to be exposed to the largest doses and at greater frequency than others. For obvious reasons, there is no epidemiological evidence which can be used to evaluate the risk from long-term exposure to these organisms and to the unique products which they can generate. The only way to acquire this data is to expose people to these substances and see what happens. For equally obvious reasons, this cannot simply be done without consent or supervision.

Given the lack of accurate medical information, there are two options available:

First, we could require that the proponents of biotechnology demonstrate the safety of their operations. This option prohibits activity until the absence of risk can be established. Given the scientific uncertainty over the nature and magnitude of risk from biotechnology, taking this option will effectively preclude development.

Secondly, and somewhat realistically, we can permit the activity in the face of uncertainty subject to various constraints, such as prescribed safety measures, consent and continual monitoring and study, designed to acquire improved information on the risks of technology. Neither of these two options is a scientific decision. Both are decisions about what to do until scientific information is available. This is the first area of uncertainty concerning biotechnology. Is the problem one of permitting or forbidding the technology or is it one of minimizing risks from its development? I think that this uncertainty has been resolved. I doubt that government or industry will be prepared to walk away from their investments on the basis of conjectural risk.

The second area of uncertainty is straightforwardly scientific. Here, what we are interested in are the special risks raised by biotechnology operations – conventional plant safety risks are not at issue here. Without appearing to minimize the knowledge vacuum surrounding the hazards of rDNA organisms, and the vacuum is considerable, there is some transferable expertise in the case of fermentation technologies. Containment controls and ventilation systems have been developed for existing industries, and where these are adequate to protect workers from existing hazards, there is no reason to suppose the recombinant processes will be significantly different. Another consideration is that it is unlikely that any known hazardous organisms will be used. Thus we are dealing with possible dangers for the most part. Health hazards are multifactorial.[3] Several events must happen before infection can occur, and a low probability or reducible margin for anyone of these events reduces the overall risk. However, analogies and probability determinations are, at best, only temporary substitutes for careful scientific experimentation into the identification and assessment of biotechnological risks. These risks can only be reduced with further empirical knowledge, which will require a significant commitment of resources. Ultimately, it must be admitted that risks are conceptually uncontrollable. You can never know if you are doing enough to prevent the occurrence of the hazard.

A third area of uncertainty concerns limitations in the mechanisms used to evaluate acceptable risk. There are strong disagreements concerning the appropriateness of cost/benefit and risk/benefit techniques.

Another contentious question has to do with representation on decision-making bodies. Whose interests are considered and what weight is attached to them? In situations characterized by uncertainty and disagreement, it is difficult to say that any solution adopted is good or bad. With environmental risks from released biotechnology, most of those placed at risk receive no direct benefits and, unless some method of guaranteeing public participation in these decisions has been used, these risks have been imposed without consent.

A final reason to be cautious about biotechnology, and also having to do with uncertainty, is bound up in the interrelation between facts and values. In dealing with new technology, information will only be produced if someone thinks it is worth having and is willing to pay for its acquisition. Granting permission for continued biotechnological development does not relieve decision makers of the responsibility to continually evaluate and monitor this technology. Other issues which are still unresolved in drug and chemical manufacturing may not apply – providing workers with the gene sequence of micro-organisms being used will not reveal the behaviour of this organism and its interactions with humans. However, obligations such as medical supervision of production employees and maintaining confidentiality of their health records will carry over.

In the face of all of the unknowns raised by biotechnology, simple prudence indicates that initial installations and products of this technology should receive careful scrutiny. Society seems to have learned some lessons from the more or less unsupervised development of the drug and chemical industries. Biotechnology entrepreneurs have a lesson of their own to learn from the nuclear industry. If a technology fails to gain the public trust through reluctance to deal fairly and openly, or if it loses this trust due to a careless accident, it will be made so expensive as to be economically unattractive.

I do not think any of the parties involved here – labour, industry, government and concerned members of the public – see the issues just raised as low priority items.

References

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2. This discussion relies heavily on Stephen Stich's article in *The Recombinant DNA Debate* ed. David A. Jackson and Stephen P. Stich, Prentice Hall Inc., Englewood, New Jersey, 1979. See pp.186-194. Other relevant material can be found in Barry Hoffmaster's article 'The Case Against the Control of Biotechnology' in *Science and Society: Its Freedom and Regulation* ed. Fraser Homer-Dixon and Ann Perkins, CSP Publications, Ottawa 1982. For a general discussion of uncertainty, see Marcia Gelpe-A.P. Tarlock, 'The Uses of Scientific Information in Environmental Decision Making' in *Southern California Law Review*, Vol.48, No.2, 1974 and *Acceptable Risk* by B. Fischoff *et al*, Cambridge University Press 1981.

3. See K. Sargeant and C.G.T. Evans *Hazards Involved in the Industrial Use of Micro-organisms* Luxemburg, 1979. A similar point concerning the nature of environmental hazards can be found in Jane Rissler 'Research Needs for Biotic Environmental Effects of Genetically Engineered Organism' in *The Recombinant DNA Technical Bulletin*, Vol.7, No.1, 1984.

OCCUPATIONAL HEALTH CONCERNS – TONY MAZZOCCHI

DR. McCALLA

Our final speaker this morning is Mr. Tony Mazzocchi. Mr. Mazzocchi has had many years' experience in the labour movement in the United States and, until his union split into U.S. and Canadian branches, he was involved in Canada as well. Currently he is with the Workers' Policy Group. He was a founding member of the Committee for Responsible Genetics.

MR. MAZZOCCHI

Thank you. It is a pleasure to be here. I would like to think it is symptomatic that, for once, we are in the process of a discussion prior to an episode rather than a discussion after an episode. I am a trade unionist and have spent my whole life in the trade union movement in the post-war period, accumulating a lot of experiences, all retrospectively.

When I came into the industry in 1946, I was led to the point of production, which was adjacent to a highly toxic substance area. I was trained by a very large multi-national corporate entity. The sum total of my training consisted of 'Be careful' and I proceeded to go to work. Things have not changed very much since that point, so I wish to apply my lessons to this new developing science. I am not a scientist and I am not here to discuss genetic engineering from a scientific point of view.

I am amazed that at the meetings I attend, I hear people speaking about 'the other scientific reality', the dynamics of commercial production and the dynamics of commercial and production imperatives, which is a science by itself. I was interested in Dr. Mustard's comment this morning about the employer who said, 'You are interfering with my profit and my production.' Therein is the entire tale.

I was reading the layman's science journal, the newspaper, this morning at breakfast, and I found a story that is descriptive of how the real world works, at least, as I perceive it. The story was about a Wapiti Aviation Limited crash. 'Former Wapiti pilot Jerome Lopez told the inquiry that, while he was never actually told to fly in weather conditions he thought were below Transport Canada limits, he believed he would lose his job if he refused', and he goes on to cite all the pilots who lost their jobs and the hiring of unpaid pilots. The story is fairly typical of the way the real world works in industry in all commercial applications. You can have all the best rules in the world, but when there are production and profit imperatives at work, you do things whether you are told to do them or not to do them, because implicit in the operation is 'You must get something done as fast as you can' and 'You must do it at a profit' and 'You must strive to maximize profit.' This is especially true if there is pressure to produce a product after you have been researching it for a long time.

In response to the question 'Who makes the most inquiries of the IBA?' Dr. Goldhammer answered, 'Analysts, to see when this industry is going to produce a commercial product.' That is the world I have lived in, and that is the world I understand.

Now, what has my experience taught me? It has taught me that when scientists argue about the efficacy and the safety of a product, as a lay person I have learned that I would like to see that argument resolved before I proceed. Unfortunately, that is not the way the world works. There is an argument going on, and I would hope Dr. Goldhammer's remarks concerning the 'safe' organisms turn out to be correct because my experience has also demonstrated 'What can happen will happen.' I am not going to bore you with a series of episodes that have occurred over the last 30 years, some of enormous magnitude – including Bhopal. We know that 'What can happen will happen.' There will be a nuclear accident of serious magnitude; there will be subsequent chemical accidents of serious magnitude unless we change the way we produce things and we change the way things are controlled in this emerging industry.

This emerging industry is not new in the sense that these are new entrepreneurs. The new entrepreneurs have mostly been absorbed into larger firms, and these larger firms have a long track record with health and safety. The drug and pharmaceutical industry and the chemical industry, which I am intimately associated with, do not have good track records on the question of health and safety of the work force, and these large companies have, in most instances, direct or indirect control over the health and safety of their workers.

The regulatory process is virtually non-existent at the present time and for the most part consists of 'Keep your fingers crossed.' The Occupational Safety and Health Administration (OSHA) in the United States has established a few guidelines which basically leave industry to control themselves. They are rather feeble guidelines, and whether they are instituted or not will be of no consequence.

So what are we worried about? When I say 'we' I mean those of us who represent people at the point of production. I am not going to talk about the ethical issues involved – that is an argument for another day – or the application of this science that will be covered by other speakers. I would like to talk about the point of production and the concerns we have.

We have learned that, as war is too important to be left to the generals, safety at the point of production is too important to be left to the employers. Firstly, we would like to see that, prior to launching any effort to produce a product, the risks are defined as far as possible and the tests that can be instituted at the point of production, e.g., medical surveillance, medical and biological monitoring are worked out. Secondly, to the extent possible, there should be a central registry for recombinant DNA processes, associated illnesses and diseases proven or suspected. This registry could be used to establish an epidemiological analysis of morbidity and mortality. We should accumulate this information as it becomes available. Over the last 30 to 35 years an awful lot of problems have been discovered in the chemical industry by using the retrospective and primitive 'body in the morgue' method. We would hate to see that happen in the area of recombinant DNA.

Another thing we have learned is that those who know what is wrong rarely tell those who need to know what is wrong. Not once in all the major disease epidemics affecting the workplace did the science community reveal what was known about that disease episode at the time it was known, neither did the corporate community nor government. Workers without any formal training in public health, using their intuitive devices, and the very primitive epidemiological 'body in the morgue' method, always proved to be correct. I have never been confronted with panicky workers or with workers who were wrong about their observations. These points should be taken into consideration when entering this new field.

There is a great deal we do not know about recombinant DNA research and its commercial application. It appears that, unlike the nuclear industry, it is not very expensive to launch new research. There will be certain imperatives at work to get things on line to make this new industry pay, and risks are inherent in that particular procedure.

As the regulatory process very rarely works, prudence dictates that workers should be given the prime responsibility and be trained to carry out all health and safety at the point of production. Health and safety personnel – doctors, nurses, hygienists – or anyone else with the professional skills that should be applied to this science are required, and industry should pay for them; but they should not be controlled by industry, they should be controlled by workers through an independent process. A fund should be set up and techniques which are credible, respected, tried and tested should be used to hire people with capability and skill. These people should have the right to enter any work site at any time and reveal what they have seen both to the workers and to the community. That is the only way the community and the workers can be assured that the processes are safe.

According to NIOSH studies, inspections of the genetics industry four or five years ago indicate that these industrial processes, even in the research stage, were not much different from those in industry generally. There were some very sloppy procedures. So I have no great faith that this industry will be able to police itself. It is just not the nature of things. It has nothing to do with good people and evil people. It has to do with the imperatives that we all deal with, especially in a period when our economies are in decline. So the question of empowerment of workers is important.

In the United States about 80 years ago, people learned that the meat industry could not be trusted to produce untainted meat, and they insisted on an intervention into the private enterprise system. They said, 'We do not trust you to produce meat in an untainted fashion. We want someone to look at the process and reveal to us what they see.' So federal inspectors, with the ability to stop the process and report what they saw, were instituted at the point of production. I am not suggesting that we need federal inspectors at each work site, but I am suggesting that workers, after being trained, should be empowered to do substantially the same thing. The worker would act as the guardian or the ombudsman for the public and the workers and should be protected against retaliation. The person should be chosen by fellow workers and should be protected from firing for any reason. That would be the only way that the workers could trust that the person would reveal what he/she knows.

The workers should be trained as the industry develops. There should be frequent certification programs. The workers need both the right to know and the right to act upon what they know, i.e. workers ought to be empowered not only to monitor the job but also to call in, not federal regulators, but people with the type of scientific and medical capability that could enter the work site and be able to assess a situation that the worker perceives to be a problem.

If we begin to develop that type of approach, we might, to some degree, avoid the ultimate confrontations that will develop after a major episode occurs. I would like to believe that once the industry gets totally off the ground we won't have a series of episodes – that we won't have a Bhopal-like accident – maybe not the release of a poisonous gas, but if there is the slightest possibility that an engineered organism can escape a physical facility and cause harm, then that probably will happen somewhere down the line. Hence I would strongly suggest that workers be empowered by the regulatory agencies.

We have learned from experience that those who know do not tell people who need to know. What is more, people need to know what they need to know prior to being introduced into a particular situation. There is a lot that we won't know, but, as we learn by experience, the information has to be conveyed immediately to those who should know. An example that we should learn from is the DBCP episode in the United States. Dr. Hein knew for 20 years that DBCP induced sterility and was a potential carcinogen. However, the workers did not know about it until their wives, using a very unscientific method of gossiping with each other at a party, discovered that their husbands all worked in the same department at the plant and, without the benefit of public health training, they perceived that there probably was something in that facility that was causing their failure to have children. Of course, when it was investigated, it turned out to be correct. That was another case just like the asbestos episode, the vinyl chloride episode, and countless other episodes that we have gone through.

We have an opportunity with recombinant DNA to approach these issues prior to the industrial process taking off. I would hope that this meeting is the beginning of continuing interactions with worker representatives, industrial representatives and the science community where the dynamics of work can be discussed and where, ultimately, we can address this problem and resolve it, at least, initially, with a commitment to approach it jointly, not in a patronizing way where those who know will tell us, 'Don't worry about it. Everything is fine. You can trust us that nothing will happen.' The method of trusting that nothing will happen has failed in the past and I would suggest that, as concerned scientists and as concerned citizens, we should learn from these experiences. Thank you.

BIOTECHNOLOGY IN ONTARIO – DR. WALMSLEY

DR. TUOHY

We heard, this morning, some general discussions about issues and risks and benefits, and something about what is going on in the United States. We will turn, this afternoon, to governmental responses in two Canadian jurisdictions: provincially in Ontario, and federally. Most of our focus will be at the federal level, but Dr. Walmsley has consented – on short notice – to give us a brief summary of developments in Ontario.

Dr. Walmsley worked in the antibiotic industry for 14 years and has spent 12 years in government. He is now science adviser with the Ministry of Industry and Trade in Ontario and is co-ordinator for biotechnology for the Ontario government.

DR. WALMSLEY

Good afternoon, ladies and gentlemen. I will be brief, but I thought it might be a good idea to put this entire discussion into perspective.

In Ontario, outside the provincial universities and medical schools, there are about 25 companies that are engaged in biotechnology. About 16 of those have less than 10 employees. Many have less than five. Some only have one, two or three.

These companies can be classified into three broad categories. Pure biotechnology companies, such as: Allelix, which is at the upper end and is probably the biggest company in the province with about 180 employees; Cangene probably has 10 to 15 employees; down to a small company called Chromagene that has, I think, either one or two.

Secondly, there are companies with biotechnology as part of a large company such as: Labatt's, which has about 20 staff, who are working on the biotechnology of yeast; St. Lawrence Starch, who are working on the microbial production of alcohol.

The third category contains companies that use the products of biotechnology. To date there are very few of these. It is reported that Denison Mines are going to do some underground bacterial leaching of uranium ore in Elliot Lake. There have been one or two reports of other mining companies doing the same. Also in this category there is the entire agricultural industry, e.g. the seed industry, people like Pioneer, who will eventually be the users of the products of biotechnology.

Following this morning's discussion, I would like to make one or two comments. There is no significant pharmaceutical industry in Canada. There is no industrial fermentation in this country, outside brewing. I would estimate, as a very, very rough guess, that in British Columbia there are about 10 companies; Alberta, about five; Saskatchewan, three; Winnipeg, two; Quebec, maybe up to 15, (this includes three big, pure biotechnology companies, which are bigger than those in Ontario, with up to 400 employees); and in the Maritimes there are probably about three companies.

I trust, ladies and gentlemen, that that will give you a brief overview of the industry in this country and help to put it in perspective. Most of these companies have probably only emerged in the past two or three years. Many of them are financially unstable. Many of them will not have products ready for the market for several years. My plea would be, do not make life any more difficult for them with too many regulations. Thank you.

CANADIAN APPROACH

CURRENT REGULATORY APPROACH – CLAIRE FRANKLIN

DR. TUOHY

I would like to introduce Claire Franklin. Claire Franklin is chief of the Environmental and Occupational Toxicology Division in the Environmental Health Directorate, Health and Welfare Canada. Her division is involved in research and regulation relating to toxic chemicals in the environment and their impact on human health. More specifically to our concerns, her division's current interest in biotechnology involves both research and regulation.

DR. FRANKLIN

Thank you very much. I was asked last week whether I would stand in for Judith Miller to address the topic of 'the current regulatory approach'. I do not imagine that I will be able to give you as broad a perspective as Judith Miller would have, but I can give you some idea of the areas that interest us. I think these areas will fit in with a number of the points that have been raised this morning.

The Environmental Health Directorate is involved in the regulation of toxic chemicals, and the question which has to be asked is: 'Should the products of biotechnology, whether they are chemicals or micro-organisms, be handled in the same way as we have been handling chemicals?' The theme of my presentation will be to address that question and give you some indication, from a federal perspective, of where we stand as far as legislation is concerned.

Slide 1

I will commence with the kinds of regulations that we have and give you some perspective on the developments that have been occurring. I should point out that a complication in Canada is the lack of specific federal legislation for all occupational safety and health. There is legislation which covers federal employees. The provinces have a legislative mandate for occupational safety and health, hence interaction between federal agencies and the provinces is essential and has to be considered in any decisions that would be made by a federal department.

Following the Asilomar Conference on recombinant DNA, at which appropriate safeguards and containment practices were recommended to U. S. officials, the Canadian Medical Research Council (MRC) struck an *ad hoc* committee. MRC issued draft guidelines for recombinant DNA research in Canada in 1976, and final Guidelines for Handling Recombinant DNA Molecules and Animal Viruses and Cells were published in 1977.

The MRC guidelines were established to minimize risk to human health from research conducted in laboratories funded by MRC. The guidelines are more comprehensive in scope than those developed in other countries because they cover work with animal viruses and cells rather than concentrating strictly on recombinant DNA.

The Biohazards Committee was established to advise on the implementation and revision of the guidelines. The committee consists of four scientists, four non-scientists and a non-scientist chairman. Revised versions of the guidelines were issued in 1979 and 1980. Interestingly enough, in Canada, this whole process developed with restrained response and without the apparent acrimony that occurred in the United States.

The MRC guidelines have been used much more widely than originally intended. The current revisions will also consider perceptions of potential hazard and bring containment levels in line with worldwide standards for biomedical research in clinical diagnostic laboratories. The task of revising the guidelines will be accomplished by a new technical subcommittee comprised of members from MRC and other relevant sectors of the government, and will report to the MRC Standing Committee on Ethics in Experimentation.

Slide 2

The federal acts in Canada that have been developed for regulation of chemicals and which could potentially be utilized to regulate biotechnology are the *Pest Control Products Act* (PCPA), the *Food and Drug Act* (FDA) and the *Environmental Contaminants Act* (ECA).

I should emphasize that we are considering both chemicals that might be formed from biotechnological processes and the microbes themselves.

The PCP Act is administered through the federal Department of Agriculture and the FDA through the Department of National Health and Welfare. Both of these acts require pre-market testing and evaluation of products prior to commercialization, and both appear to be sufficiently broad to enable regulation of chemicals and microbes which are developed through biotechnology.

The *Environmental Contaminants Act* is administered jointly between the Departments of Health and Welfare and Environment. It is used to control the release, importation, manufacture and processing of a substance and its contents and products that the government has reason to believe could pose a potential threat to human health or the environment. In this act, however, the burden of proof is on the government, and under the existing act it is difficult to acquire or require additional information on new chemicals when there are insufficient data to demonstrate an environmental or health hazard. There are requirements for notification of chemicals which are imported or manufactured in excess of 500 kg, but there is no provision for pre-manufacture notice or pre-market notification, which means that a product could be in commercial use before any concerns would be raised about its safety. Also, the current definition of 'substance' under the *Environmental Contaminants Act* would preclude its use for regulating microbes. Chemicals produced through biotechnological processes could be regulated.

Hence it appears that microbes that would be intentionally released, that are not used as pesticides or drugs, cannot be adequately regulated under existing federal legislation. However, I should point out that the *Environmental Contaminants Act* is currently being considered for amendment. The amendments may make the Act suitable for at least some aspects of control of microbial biotechnological products.

As well as considering whether or not the Act would cover products of biotechnology, it is important to assess whether the guidelines or the data requirements under the Act would be sufficient to control the product. This appears to vary for different products. The federal government has an Interdepartmental Working Group on Safety and Regulation, which is having a more detailed look at such legislative aspects.

Slide 3

It is important to consider the spectrum of things that might be considered for regulation: the point of manufacturing; the manufacturing process; and the products and by-products that may result from some of these processes.

Slide 4

Now, I will discuss chemicals that are produced by biotechnological processes. We need to consider whether we should regulate the process or the chemicals. For existing chemicals, in most instances, it is the chemical itself that is regulated, not the process through which the chemical was derived. Obviously, there are regulations for the manufacturing processes as far as the workplace is concerned, and I think that there would not need to be any difference in the approach for biotechnology. The reason that I want to make this point is, as you will see a little later, this contrasts the way the regulations are going in the United States.

Now, a question which should be asked is whether the data requirements that exist for chemicals are sufficient to allow evaluation of chemicals produced through biotechnology.

I will use the example of pesticides, because we do have, I think, a fairly reasonable handle on the types of data requirements that are used, and we have a mechanism for regulating these products.

Slide 5

In order to register a pesticide, the manufacturer has to provide information on the specifications of the product; the analytical methods; the manufacturing methods; the quality control methods utilized; impurities; information on toxicology; residues; the environmental chemistry and fate; environmental and non-target studies; efficacy; and a sample of the product.

The approach does not need to be different for a chemical produced through a biotechnological process as opposed to a standard chemical manufacturing process. These requirements are sufficient to identify any differences that might occur as far as impurities or environmental chemistry and fate. There may be a requirement for different tests to get the specific information, but the types of tests required would be very similar.

Slide 6

From a toxicology point of view, there are requirements that there be testing done to identify the acute toxicity of the product with the various routes of exposure (oral, dermal and inhalation) to determine the effects of repeated exposure; the long-term effects; and to conduct oncogenicity testing in two species. We also require other studies on the pharmacokinetics, mutagenicity, teratogenicity, reproduction and exposure. Similarly, a chemical from a biotechnological process should have the same data requirements and the information utilized for hazard assessment.

Slide 7

Now, I would like to summarize the approaches for regulation of toxic chemicals and pesticides in the United States under the *Toxic Substances Control Act* (TSCA) and *Federal Insecticide, Fungicide and Rodenticide Act* (FIFRA) and how they relate to biotechnology.

The definition of a chemical under TSCA is sufficiently broad to include both chemicals and micro-organisms. At the time the act was implemented, existing chemicals and micro-organisms were placed on an inventory and exempt from pre-manufacture notification (PMN). Any new chemical is affected by the provisions of the Act. This concept of 'new' has resulted in the consideration that genetic engineering would result in the development of a new chemical/microbe and subject to regulation, whereas selection of mutant strains would not. This issue is under active discussion in the U.S.A., and there may be modifications of this position. As one of the earlier speakers mentioned, there is a large group of uncertain products that would not necessarily be considered as having newly synthesized nucleic acid, but that would have been derived by manipulation of the genetic material through various processes. To my knowledge, decisions have not been made on whether these particular manipulations would result in these being considered new chemicals or new organisms and subjected to PMN notice. Interestingly, a microbe selected from a toxic waste site or something like that could perhaps be artificially mutated, but would be construed as an existing product and would not be subjected to pre-manufacture notice.

Under the *Environmental Contaminants Act* in Canada, we have no provision to cover micro-organisms.

In both the United States and Canada the registration of pesticides is done on a product-by-product basis, so whether the product is produced through genetic manipulation or whether it is a naturally occurring microbe should not result in differential treatment; they would still be subjected to regulation under the Act.

The importance of this slide is to show that in the United States, they are trying to fit a new technology into existing legislation (TSCA), using an artificial separation between a genetically engineered organism and a natural mutant. However, under FIFRA and the PCP Act we do not see that same separation.

Slide 8

It is proposed that micro-organisms could be placed in two categories, one in which organisms have changes in their own genetic material for which there is no reason to differentiate between organisms according to whether the changes in their DNA material occur naturally or as a result of our technology.

The second category (organisms that contain foreign genetic material) is more problematical. These organisms, to the best of our knowledge, would not have occurred in nature. We have to be a little more cautious about organisms in this category because we really do not know how they might behave if they were released to the environment.

Slide 9

There are a number of regulatory options for these two categories. We could consider that Category 1 should be handled in the same manner as what we have called 'biologicals' (naturally occurring microbes). We have a history of use of these organisms and some confidence in how they should be handled. Hence we could consider whether the guidelines that we are using for biologicals would be applicable to a genetically engineered organism.

For Category 2, we need to verify the similarity to naturally occurring products. This could be done with some easily answered questions. I am suggesting that if we can break this analysis into bite-sized pieces, we might have some confidence in the way we would handle the organisms in Category 2. We would have to ascertain whether we needed to develop new tests to determine how the organisms would behave in the environment and their potential toxicity/pathogenicity in people. Products in this category should be considered very carefully until we have some capability of assessing this situation and we have reason to have a little more confidence in their behaviour.

This is an analogous approach to that developed with the RAC and MRC guidelines. We started out with stringent requirements, but, as we gained some experience, we were able to relax some of these requirements.

Slide 10

In making these assessments, we would certainly need more data for a genetically engineered organism than we need for a biological, such as *Bacillus thuringensis*, which is a fairly widely used microbe for pest control. We would definitely need to know the method of insertion; the identity of the inserted gene segment; data on the control region of the genes; description of new traits or characteristics; data on the genetic stability; and data on the DNA sequencing. Other additional requirements may become obvious as we proceed with the issue.

Slide 11

This slide shows the data requirements for a biological control product. They are very similar to the data requirements for a chemical; however, the tests to provide the data will be different. The registrant is required to provide:

1) specifications for the particular biological. These specifications would include the strain identification, the amount of active ingredient (a.i.). (Interestingly enough, in a product such as *Bacillus thuringensis*, it is not the bacteria that are the active ingredient – it is the toxin.)
2) the manufacturing methods;
3) quality control;
4) impurities (For any manufacturing process you will have different impurities in the product, and you would have to identify that.);
5) toxicology (The toxicology testing, like that for chemicals, should be performed on the product that is to be sold so that if there were impurities in it, the test organism would be exposed to the active ingredient as well as to the impurities.);
6) residue data;
7) environmental and non-target studies, etc.

Slide 12
The tier approach has been applied to the data requirements for biologicals. One of the main criteria that must be ascertained is whether or not the organism is infective. With biological control agents this is a most important criterion since evidence of pathogenicity in humans or in a non-target species may well mean the end of the product. The tier-testing approach would give some idea whether the product was ineffective, some indication of its toxicity, irritation and persistence. If all of these tests are negative, generally the product would be considered suitable. If some of these tests are positive, further testing to delineate the particular problem is required. For example, if some of the toxicity tests are positive, there might be a toxin in the product that should be identified. The testing requirements for biologicals would be sufficiently broad to cover genetically engineered organisms, particularly for Category 1 organisms.

Slide 13
Genetically engineered organisms can be put into three broad categories, as shown on this slide. Organisms in Category 1 will be particularly fit, will persist, reproduce and increase in numbers. The environmental impact of these types of products may be much more significant than a new organism in the second category that has a limited environmental survival. In looking for organisms for intentional release, it may be wise to look for organisms with limited survival; then we would not have quite the same concerns that the organisms would establish themselves and take over new environmental niches.

A third category where there seems to be some development includes engineered organisms that are killed but contain the active agent. This is the case with a bacillus where the toxin has been synthesized in a biopackage and the organism killed, leaving just the toxin. I think that sort of product would be regulated as a chemical as long as one can provide information to support the fact that all the organisms have been killed.

In summary, the existing legislation for drugs and pesticides appears to be quite suitable, both for microbes that are naturally occurring and those that are engineered, that is, the process appears suitable even though different tests may be required. The *Environmental Contaminants Act* needs to be modified to cover microbes.

In addition, we are suggesting that:

1) chemicals that are inanimate products of biotechnology should not be considered unique, hence the existing guidelines could apply;
2) organisms be put into two categories on the basis of whether or not they contain foreign genetic material and not on the method used for their development;
3) the tier-testing approach for toxicity that has been used for biologicals could be used for genetically engineered products. The next stage is to specify the kinds of tests that might be necessary to answer the kinds of questions that I have posed.

I think we should, collectively, draw upon whatever information and data bases we have accumulated from products that have already been used. All the information should be considered, whether it is from workplace situations or environmental situations, to try to determine whether or not genetically engineered organisms with no foreign DNA are similar to naturally occurring ones. Then we should build on that data base for organisms that contain foreign DNA.

Thank you.

Claire Franklin
Slide 1

GUIDELINES FOR rDNA RESEARCH IN CANADA

Development

- through MRC and published in 1977
- revised in 1979, 1980
- Biohazards Committee advises on implementation and revision of guidelines

Purpose

- established to cover research conducted in labs funded by MRC
- undergoing revision to include full range of human and animal pathogens and to bring containment levels in line with worldwide standards

Expansion of Area

- general agreement that they should not be modified to cover non-research labs

Claire Franklin
Slide 2

PRIMARY FEDERAL LEGISLATION IN CANADA FOR CHEMICALS

PEST CONTROL PRODUCTS ACT

FOOD AND DRUGS ACT

ENVIRONMENTAL CONTAMINANTS ACT

Claire Franklin
Slide 3

TECHNIQUES

- Genetic Engineering
- Enzymes and Enzyme Systems
- Fused-Cell Techniques
- Plant-Cell Culture
- Process and Systems Engineering
- Fermentation

APPLICATIONS

- Nitrogen Fixation
- Novel Aspects of Cellulose Utilization
- Human and Animal Health Care
- Treatment and Utilization of Wastes
- Mineral Leaching

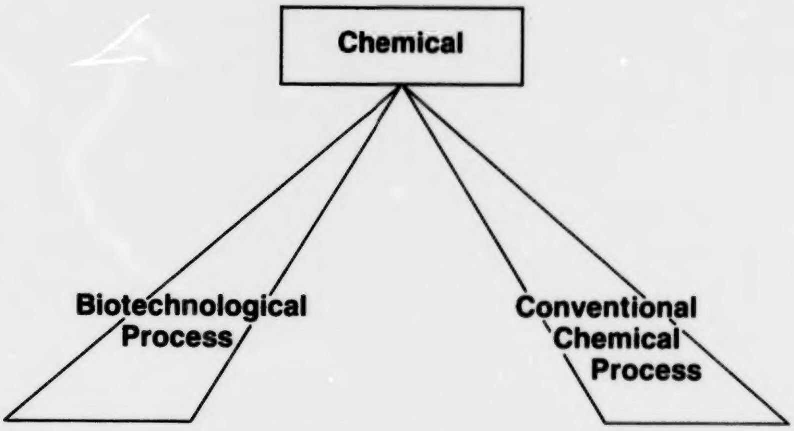
PRODUCTS

- New Plant Strains
- Chemicals
- Pest Control Agents
- Pharmaceuticals
- Liquid and Gaseous Fuels
- Single Cell Protein

Claire Franklin

Slide 4

REGULATION: PRODUCT OR PROCESS?



Chemical

Biotechnological Process

Conventional Chemical Process

Claire Franklin
Slide 5

REGISTRATION DATA REQUIREMENTS (CHEMICALS)

Specifications
Analytical Methods
Manufacturing Methods
Quality Control Methods
Impurities
Toxicology
Residue Data
Environmental Chemistry and Fate
Environmental and Non-Target Studies
Efficacy
Sample of Product

Claire Franklin

Slide 6

TOXICITY TESTING REQUIREMENTS (CHEMICAL PESTICIDES)

Acute Tests

- LD_{50} (oral, dermal, inhalation)
- Irritation (dermal, eye)
- Sensitization
- Delayed neurotoxicity

Short Term

- 90 day (oral, dermal, inhalation)
- 1 year feeding
- Delayed neurotoxicity (if acute test positive)

Long Term

- 2 year feeding
- Oncogenicity (2 species)

Special Studies

- Pharmacokinetic (absorption, distribution, excretion, metabolism)
- In vitro Mutagenicity (point mutation, chromosomal aberrations, DNA repair)
- Teratogenicity
- Multi-Generation Reproduction
- Exposure

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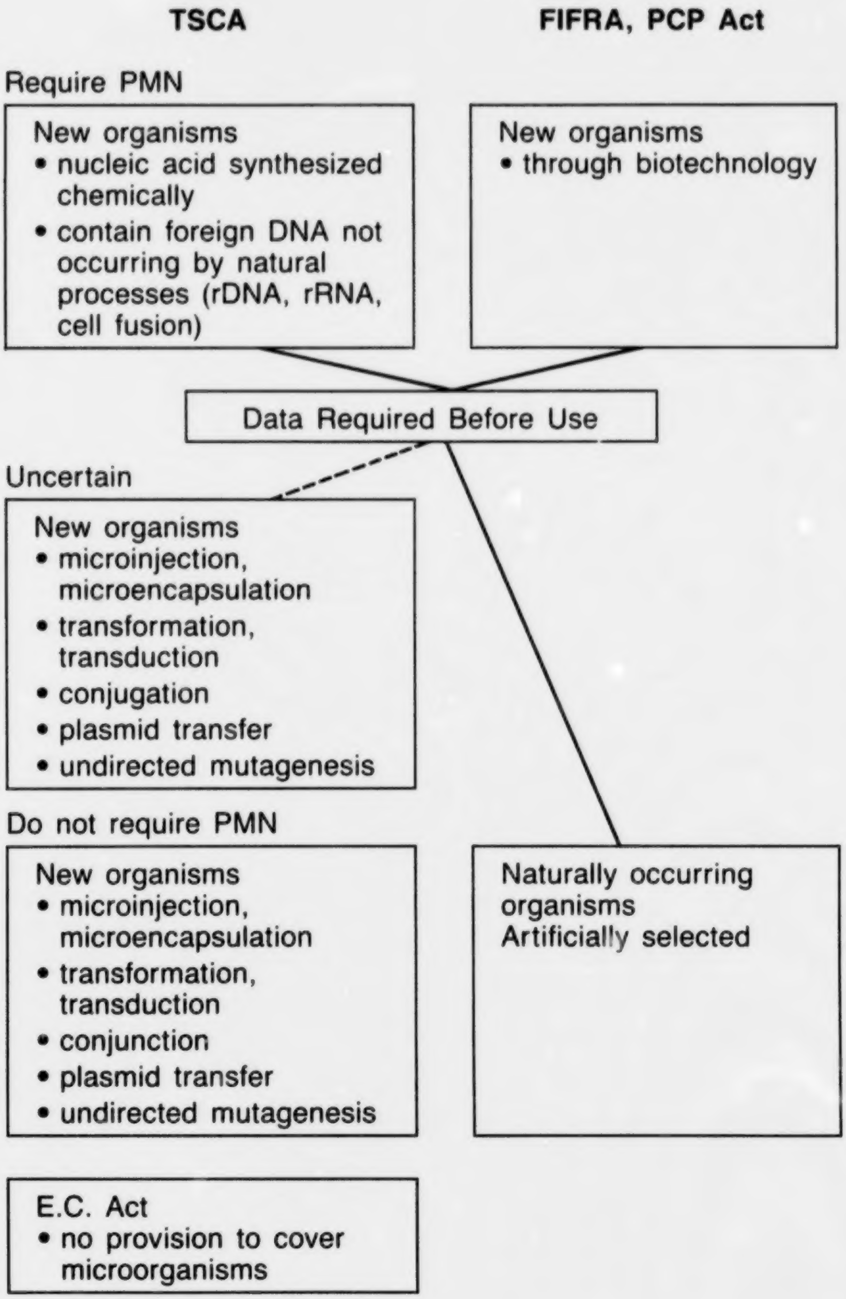
Slide 7

REGULATION: PRODUCT OR TECHNOLOGY?



TSCA

FIFRA, PCP Act

Require PMN

New organisms
- nucleic acid synthesized chemically
- contain foreign DNA not occurring by natural processes (rDNA, rRNA, cell fusion)

New organisms
- through biotechnology

Data Required Before Use

Uncertain

New organisms
- microinjection, microencapsulation
- transformation, transduction
- conjugation
- plasmid transfer
- undirected mutagenesis

Do not require PMN

New organisms
- microinjection, microencapsulation
- transformation, transduction
- conjunction
- plasmid transfer
- undirected mutagenesis

Naturally occurring organisms
Artificially selected

E.C. Act
- no provision to cover microorganisms

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Slide 8

BIOLOGICAL CATEGORIES FOR BIOTECHNOLOGY

1. Organisms that have changes in their own DNA (regardless of how the changes arose)
2. Organisms that contain foreign DNA (regardless of how the DNA was introduced)

Claire Franklin

Slide 9

REGULATORY OPTIONS FOR INTENTIONAL RELEASE GEO

Category 1 (changes in their own genetic material)

- should be handled in same manner as biologicals

Category 2 (presence of foreign DNA)

- verification of similarity to naturally occurring products
    - development of methods to evaluate human health and ecological hazards
    - no uses until data are available to characterize environmental behaviour

Claire Franklin
Slide 10

SUGGESTED ADDITIONAL DATA REQUIREMENTS FOR GENETICALLY-ENGINEERED ORGANISMS*

Data on method of insertion

Identity of inserted gene segment

Data on control region of genes

Description of new traits or characteristics

Data on genetic stability

Data on DNA sequencing

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* modified from Betz et al., Recombinant DNA Technical Bulletin *6*:135, 1983

Claire Franklin
Slide 11

REGISTRATION DATA REQUIREMENTS (BIOLOGICALS)

Specifications (strain, identification, amount of a.i.)

Manufacturing Methods

Quality Control Methods

Impurities or Extraneous Materials

Certification of Ingredient Limit

Toxicology

Residue Data

Environmental and Non-target Studies

Environmental Fate

Efficacy

Sample of Product

Claire Franklin
Slide 12

TOXICITY TESTING REQUIREMENTS (BIOLOGICAL PESTICIDES)

Test	Species
Tier 1*	
Oral LD$_{50}$	Rat**
Dermal LD$_{50}$	Rabbit or Rat**
Inhalation LC$_{50}$	Guinea Pig or Rat**
Intraperitoneal	Rat or Mouse**
Primary Eye and Skin Irritation	Rabbit or Guinea Pig
Cellular Immune Response	Mouse
Hypersensitivity	Guinea Pig or Hooded Lister Rat
Tier 2	
Quantification of Persistence (most appropriate route)	Rat and Rabbit
Short-Term [90 day] (most appropriate route)	Rat or Mouse
Tier 3	
Chronic Oral	Rat
Oncogenicity	Mouse
Teratogenicity	Two species including one non-rodent

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* If infectivity is clearly demonstrated in Tier 1 testing, organisms would not be considered for further development.

** endpoints examined should include persistence, infectivity and toxicity

Claire Franklin

Slide 13

CATEGORIES OF GENETICALLY-ENGINEERED PRODUCTS

1. New organisms that are fit, can persist, reproduce and increase
2. New organisms that have limited environmental survival
3. Bio-Packages
   - engineered organisms killed but containing active agent

ENVIRONMENTAL ISSUES – TERRY McINTYRE

DR. TUOHY

I would like to turn now to Terry McIntyre, who is a science policy analyst with the Environmental Protection Service of Environment Canada. He is a graduate of the Universities of Western Ontario, Waterloo and Guelph. He is co-chairman, along with a representative of Health and Welfare Canada, of the federal government's Working Group on Safety and Regulations in Biotechnology, and he was a member of the recent Canadian delegation to the OECD, currently examining the whole area of health and safety regulations in biotechnology.

MR. McINTYRE

Thank you very much, Dr. Tuohy.

ABSTRACT

The advent of significant breakthroughs from developments in a broad spectrum of genetically engineered processes and products is imminent with the promise of untold benefits to mankind. Associated with these developments are a series of potential health, safety and environmental concerns which, unless addressed appropriately, could seriously impede the great promise shown by biotechnology.

Those areas of greatest concern include:
- questions relating to adequacy of existing legislative/regulatory structure;
- paucity of data on emission streams from scale-up to commercial size production facilities;
- no guidelines or criteria for open release of biological organisms;
- no contingency plans for accidental release of biological organisms; and
- pervasive elements of environmental risk.

There exists a need to balance perceived concerns about the safety of biotechnology products against the competitiveness of Canada in both domestic and international markets, while, at the same time, recognizing that these products and processes offer considerable environmental benefits.

1. INTRODUCTION

Overview of National Biotechnology Strategy

In June 1983 the federal government formally recognized biotechnology as a national priority for economic development based upon its future contribution to Canadian resource and manufacturing industries. Four areas of strategic importance to Canada were identified:
- Nitrogen Fixation and Plant Strain Development
- Metal Recovery and Mineral Leaching
- Cellulose Utilization and Waste Treatment
- Human and Animal Health Care
  (See Chart 1 and Definitions)

What I propose to do in the next 20 minutes is threefold:

1) Highlight those potential benefits and perceived biohazards associated with products and process development from genetic engineering in those targetted areas (as well as other sectors outside of Canada) where the likelihood for technology transfer appears great.
2) Identify those areas of environmental concerns which may impede progress in development and commercialization of biotechnology in Canada (treating occupational health or safety concerns as a subset of the total environment).
3) Examine other external factors which may complicate/exacerbate attempts to address environmental concerns.

Time permitting, I would also like to provide an overview as to what Environment Canada is doing in biotechnology. Before I begin, I would like to preface what I am about to say with the following. The operational words in my presentation are *potential* (benefits) and *perceived* (biohazards). As in the majority of cases, the products and processes expected to result from those technologies which constitute biotechnology are not firmly entrenched. Consequently, only some preliminary observations can be made.

Definition of Biotechnology

There is considerable variance in definitions of biotechnology at the international level, but for the purpose of this session it will be defined as 'The utilization of a biological process, be it *via* microbial, plant or animal cells or their constituents, to provide goods or services.' There are five major techniques which form the basis of what is currently considered to be biotechnology. These are:

(1) *Genetic Engineering*

Genetic engineering or recombinant (rDNA) techniques reflect a recent development in molecular biology where selected strands of DNA are taken from the cells of a plant or animal, from micro-organisms or created by chemical synthesis, joined to fragments of another piece of DNA and then the reconstructed DNA is transferred to a micro-organism. Through this technique, microorganisms can acquire new genetic properties and the resultant ability to create a new product or to use or transform a particular substance. Because of its broad areas of application, from production of health care products to direct conversion of cellulose and starch into fermentable carbohydrate, genetic engineer ing has been accorded high priority in the development of biotechnology.

(2) *Enzymes and Enzyme Systems*

In terms of utilization, the ability to immobilize enzymes holds great promise for future industrial processes. The adoption of enzyme technology permits the development of new flow processes which are characterized by increased stability and greater control over enzymatic efficiencies. As well, the use of bacteria, fungi, plant and animal cells as immobilized multienzyme systems offers an additional advantage of accomplishing complex transformations, which, when accomplished by conventional chemical processes, are extremely costly, time consuming and inefficient.

(3) *Fused Cell Techniques*
This technique is simply the fusion of any two cells to produce a hybrid entity or the fusion of a neoplastic cell with any cell which is capable of making a useful biological entity, thereby rendering the resultant hybrid capable of unrestricted growth and production. This process has great potential, particularly as it relates to developing plant species which exhibit greater growth, disease and climatic resistance, and nitrogen fixing capabilities.

(4) *Plant Cell Culture*
This technique involves culturing plant cells *in vitro* as a means of providing required plant substances while avoiding the necessity of whole plant cultivation. This process has particular value in the artificial production of medicinal agents traditionally obtained from plants.

(5) *Process and Systems Engineering*
Process and systems engineering will play a central role in the initiation, application and commercialization of biotechnology. This is due to the very nature of the biological and microbial operations, products and techniques which will require special processing procedures and precautions, handling and control.

2. APPLICATIONS OF BIOTECHNOLOGY TO TARGETTED AREAS WITHIN NATIONAL BIOTECHNOLOGY STRATEGY

Agri/Forestry Applications and Trends

Five agricultural research sectors are identified as having the greatest promise for biotechnology exploitation in Canada and abroad. (Biotechnology, December 1983):

(1) *Crop Production and Improvement*
Crop production will be enhanced through the development of plants with greater nutritive value, early maturity, disease resistance and stress tolerance. Plant biotechnology will also contribute through accelerated breeding programs to the selection of desirable mutants and to the production of novel hybrids.

(2) *Plant Health*
The potential applications of biotechnology to plant health and the control of viral, bacterial, fungal and invertebrate pests of plants are limitless. As well, considerable emphasis is being placed on biological control methods or agents in integrated pest management schemes.

(3) *Biological Nitrogen Fixation*
Considerable research has been directed towards the biological fixation of nitrogen in non-leguminous plants. Many questions remain, however, as to the compatibility of legumes, nitrogen fixing micro-organisms, nitrogen fertilizers and the formation of hydrogen gas.

(4) *Animal Health and Production*
Disease diagnosis using genetically engineered monoclonal antibodies and disease prevention through the use of stable, effective animal vaccines are expected to be the major contributions from biotechnology to improved

animal health. Effort is being directed to advanced technologies, which include test tube breeding and embryo engineering.

(5) *Food Processing Technology*
Genetic applications to food processing technology encompass many diverse components, including:

- alcohol production from biomass;
- single cell protein;
- production of essential amino acids and vitamins as food additives;
- hormones as growth promoters;
- antibiotics.

(CARC – Biotechnology Research and Development for Canada, April 1983)

The potential for significant achievement in Canadian agriculture appears quite strong in areas of new animal vaccines, production of disease resistant crops and a wider range of hybrid seeds. (See Chart 2.)

Pharmaceuticals (Animal and Health Care Products)

The largest effort to date in commercial application of biotechnology techniques has taken place in the pharmaceutical sector. The use of biotechnology to manufacture pharmaceutical products can be viewed from three different aspects:

- Biotechnology can be used as a substitute for conventional methods of production, which include chemical synthesis and extraction from tissue.
- Biotechnology may be used to produce unprecedented amounts of currently scarce biological compounds, of which, certain regulatory proteins provide the leading examples.
- The use of biotechnological methods in the production of pharmaceuticals yields basic knowledge on which future research can be based.

One area of great potential promise in pharmaceuticals is the use of DNA probes as diagnostics. These applications are particularly promising in their ability to provide medical research with rapid and direct diagnostic capabilities that traditional tests cannot provide. These areas of greatest potential (and of possible biohazards) are listed in Chart 4.

Microbial Mining and Metal Recovery

The application of genetic engineering techniques to the mining sector, although quite promising, is currently limited in scope to two areas:

- accumulation of metals by organisms, either by binding at cell surfaces or by intra-cellular uptake of metals;
- biochemical transformations of metals including solubilization or precipitation, oxidation/reduction processes and the conversion of inorganic and organic metal compounds.

The metal industry as a whole has displayed less enthusiasm than other sectors involved in biotechnology. Several possible criteria are considered by companies when looking at projects. These include:

- They focus on extraction or recovery of precious metals.
- They solve more than one problem of cost, energy conservation or pollution at once.
- They offer some unique advantage rather than compete directly with conventional processes (Curtin, M., Microbial Mining and Metal Recovery: Corporations Take the Long and Cautious Path, *Biotechnology*, May 1983, pp. 229-235). A number of possible applications are being developed from genetic engineering which offer considerable benefits. (Chart 3.)

Pollution Control and Waste Treatment

Both considerable effort and promise have been shown for commercial development potential from genetic engineering in a number of areas of pollution control and waste treatment. Current activities in this section fall into three areas:

- biodegradation of organic substances such as petroleum products, pesticides, herbicides, industrial solvents;
- biological denitrification and desulfurization processes;
- removal or concentration of toxic heavy metals.

The most promising of these research areas is focused on traditional physical/chemical treatment of industrial pollutants where biological systems offer several advantages which include:

1) low capital investment;
2) low energy consumption (even generation of methane **via** anaerobic digestion);
3) self-sustaining operation; and
4) possible product recovery (Patterson, J.W., *Biotechnology*,October 1983).

Overall research in the areas of microbial degradation of toxic wastes has been hampered somewhat by a number of factors, some of which are:

- immense complexity of the problem, which requires effective communication and co-operation amongst scientists and engineers;
- research funding, necessary to stimulate the research community and develop new talent, has been lacking;
- lack of clear regulatory guidelines and accepted protocols for testing and evaluating genetically engineered microbes that may degrade toxic material;
- the desire to have a 'quick fix' for a particular pollutant. These usually employ presently available alternative technologies (i.e., incineration, deepwell injection);
- lack of a strong economic incentive for industry to develop bioprocess technology because many of the treatments are used infrequently;
- companies have avoided drawing public attention to their waste problems and are wary of possible adverse public reaction to using genetically engineered microbes; and, finally,
- a lack of knowledge of the biochemistry, metabolizing genetics or natural ecology of microbial species used in biodegradation (McCormack, D., Biotechnology, May 1985, Zaborsky, O.R., Biotechnology, October 1983).

Moreover, a number of possible applications are being developed for consideration in a broad range of pollution control and waste treatment areas. (See Chart 5.)

Chemical Production (Industrial and Specialty)

The chemical industry has been influenced extremely by developments in genetic engineering to the extent that an evolution is occurring in which biological processes and renewable resources are expected to replace the traditional, physical/chemical transformations of petroleum feedstocks (Levin, M.A., *et al*, 1984). Although only in the developmental stages, the application of biological processes to the chemical industry offers significant potential in a broad range of areas, some of which are listed in Chart 6. It is expected that economics favouring the use of bioprocesses in the chemical sector will depend substantially on process design and engineering characteristics rather than on the biotechnology involved (Levin, *et al*, 1984).

Energy Production

The potential applications of biotechnology in the energy sector are vast, with the possibility of supplanting our traditional dependence upon fossil fuels. Current activities within the energy sector fall within two general areas: energy from biomass and enhanced oil recovery. Biomass fuel sources have several major advantages over fossil fuels, most notably they are renew able, flexible through crop switching, adaptable through genetic manipulation and more evenly distributed. However, the production of biofuels (ethanol, methanol) from unconventional feed-stocks has progressed only to the pilot scale with large-scale commercial applications expected in the future. Therefore, the potential environmental hazards resulting from applications of applied genetics in energy production are highly speculative, but, nevertheless, several potential positive benefits and areas of potential concern can be addressed. (See Chart 7.)

3. OVERVIEW OF ENVIRONMENTAL CONCERNS TO COMMERCIALIZATION OF BIOTECHNOLOGY IN CANADA

The major concerns of commercialization of a number of products and processes associated with biotechnology relate to five specific areas:

Open Release of Biological Organisms

Predicting specific type, magnitude or probability of environmental effects associated with deliberate release of genetically engineered organisms will be extremely difficult, if not impossible. No historical and scientific data base exists concerning the behavioural characteristics of genetically engineered organisms in the environment. In addition, as experiences with natural organisms have demonstrated, it is possible to make only imprecise estimates, at best, of the effect that an organism may have on the environment (example of mongoose in Jamaica, rabbit in Australia, Nile perch). (See F.E. Sharples 1983.)

Accidental Release of Biological Organisms

Questions relating to the accidental release of biological organisms include:

- Could it cause disease in plants and animals and man?
- Could it pass any of its genes to related species?
- Could it proliferate, spread to other habitats and survive there?
- Could it be contained by biological and chemical means?

Environmental Risk

While criteria for human and domestic animal health are embodied in various regulations and are fairly well defined, parallel developments of criteria for assessing the risks of bioengineered organisms and products to the environment have not yet occurred. The nature of these risks are fairly well defined, but their magnitude is uncertain. As noted by one author:

> 'While the magnitude of the risks to health and environment posed by biotechnology and the likelihood of those risks occurring are largely unknown, the current crisis over hazardous by-products of the postwar chemical evolution counsels a cautious approach to this new technology.' (McChesney and Adler, 1983)

Those areas of particular concern include:

- Unlike inanimate chemical substances widely familiar as environmental pollutants, biological products are living matter and pose significantly different risks. Like existing pollutants, bioengineered products can exhibit acute toxicity, carcinogenicity or other health effects. In addition, they reproduce, multiply and compete effectively with existing species for resources.
- A bioengineered organism may be inherently toxic to something else in the target ecosystem or it may form toxic products of by-products. Unlike inanimate chemical pollutants, however, biotechnological products could produce a significant variety of indirect effects.

The following interrelated questions require further clarification:

- Can an assessment of the probability that a novel organism will be established and cause ecological damage be made on the knowledge that is already available in the ecological literature?
- How different must an organism's genome be to change its role in the environment?
- In general, how relevant is available ecological data to the question of environmental risk? (F.E. Sharples, 1983)

Waste Streams from Biotechnology Production Facilities

Because of the proprietary nature of most industrial processes and the lack of commercial scale production facilities of contained processes, little or no data are available as to the specific characteristics of waste streams. Questions also relate to control technologies currently employed in biotechnology processes which are aimed at treatment of chemical contaminants in waste streams rather than control of biological contaminants. With the exception of incineration, these technologies have little or no impact on the microbe contained in the process discharges. (U.S. EPA 1984.)

Need for Public Education

Commercial biotechnology is used worldwide to contribute significant benefits to the health and welfare of society, yet the public's understanding of capabilities, promise and limitations appears not to have kept pace. As noted by one author, 'To the extent that public perception translates into public policy, our national commitment to pursuing commercialization of biotechnology may be in some peril if ignorance engenders fear of biotechnology research and applications.' (Price, M., Biotechnology, April 1985, p.211.) A public with the technological savvy is more likely to support innovative research. To borrow a term from U.S. science educator, Mary Budd Rowe, 'Fate Control – sense that people can know and influence the direction of society as it affects their lives is essential for participatory democracy.'

Other External Factors Which May Impede Commercialization

- Biotechnology is not monolithic but a number of techniques with a number of potential product and process applications.
- It is unrealistic to assume that a single regulatory regime could address each aspect in research, development, distribution, manufacture, use and disposal of biotechnology products and processes, particularly when the full range of activities is, as yet, unknown. (See Canadian Environmental Law Research Foundation 1985.)
- There are no legislative controls over the use of pathogenic organisms for experimental purposes in Canada (Institute for Public Research).
- There is no legislative authority that requires pre-market assessment of genetically engineered organisms prior to a discovery of adverse outcomes (SCC, 1984 Krimsky Report, unpublished draft).
- The concerns over biohazards transcend jurisdictional and political boundaries . . . there are over 240 federal and provincial statutes that, in one way or another, relate to occupational health and safety alone; four hundred sets of regulations and 70 different government departments charged with delivering these regulations (Ilgen, T., 1983 Regul. Toxic Substances in Canada).
- There are no provisions with Investment Canada for a formal review to monitor foreign investment or technology transfer to Canada.
- The only existing guidelines relating to rDNA in Canada apply only to research facilities. There are no special procedures for large-scale rDNA work, for deliberate release into the environment of any organism containing a rDNA molecule or provisions for voluntary compliance by any industry in Canada.

4. ENVIRONMENT CANADA'S APPROACH TO BIOTECHNOLOGY

The lead for biotechnology within Environment Canada has been assigned to the Environmental Protection Service (EPS).

The Environmental Protection Service of the Department of the Environment (DOE) is currently in the process of developing an action plan to address the broad range of concerns associated with the products and processes accruing from genetic engineering. Implementation of this action plan will allow us to pursue a tripartite approach to biotechnology. More specifically, to:

- develop a data base to permit evaluation of ecological/public health implications of developments in genetic engineering;
- permit a rational response to requests for information on genetically engineered products and processes;
- exploit this technology in order to enhance the environment.

To this end, EPS has undertaken the following:

(1) On behalf of the federal and provincial governments, and in co-operation with MOSST, EPS has co-ordinated and completed an OECD series of questionnaires designed to identify exist ing and proposed legislation which could be applied to agricultural, industrial and environmental applications of biotechnology products and processes. A draft report is available internally with a 'restricted' designation.
(2) The Environmental Protection Service co-chairs the federal government's Working Group on Safety and Regulations in Biotechnology.
(3) EPS, in concert with Health and Welfare Canada, provides representation to the OECD expert working group on biotechnology. Through this mechanism, DOE is able to monitor and access information on international initiatives and activities relating to biotechnology/ environment interface. (See Chart 1.)
(4) EPS co-chairs an intra-departmental committee on biotechnology, which meets on a regular basis to provide a comprehensive environmental overview to issues associated with biotechnology.
(5) EPS has recently established a network under the National Biotechnology Strategy to improve applications of genetic engineering to pollution control and waste utilization. Tentatively called BioQual, this network is to be administered in co-operation with the National Research Council. The first workshop is scheduled for early 1986. (See Chart 1.)
(6) EPS represents Environment Canada on an External Affairs subcommittee on biotechnology. Through this mechanism EPS is able to utilize the scientific desk officers at a number of Canadian embassies to monitor activities relating to biotechnology in their respective host countries.
(7) EPS is currently undertaking three projects through partial funding from the National Biotechnology Strategy. Work is underway on three applications of genetic engineering to anaerobic treatment of cellulosic waste streams, biological degradation of toxic chemical species and degradation of PCBs in soil.
(8) An action plan on biotechnology is being prepared for the EPS executive committee. It is anticipated that this action plan will detail a departmental response to a broad array of environmental concerns associated with genetically engineered products and processes.

CANADIAN NATIONAL BIOTECHNOLOGY STRATEGY 1983-1987

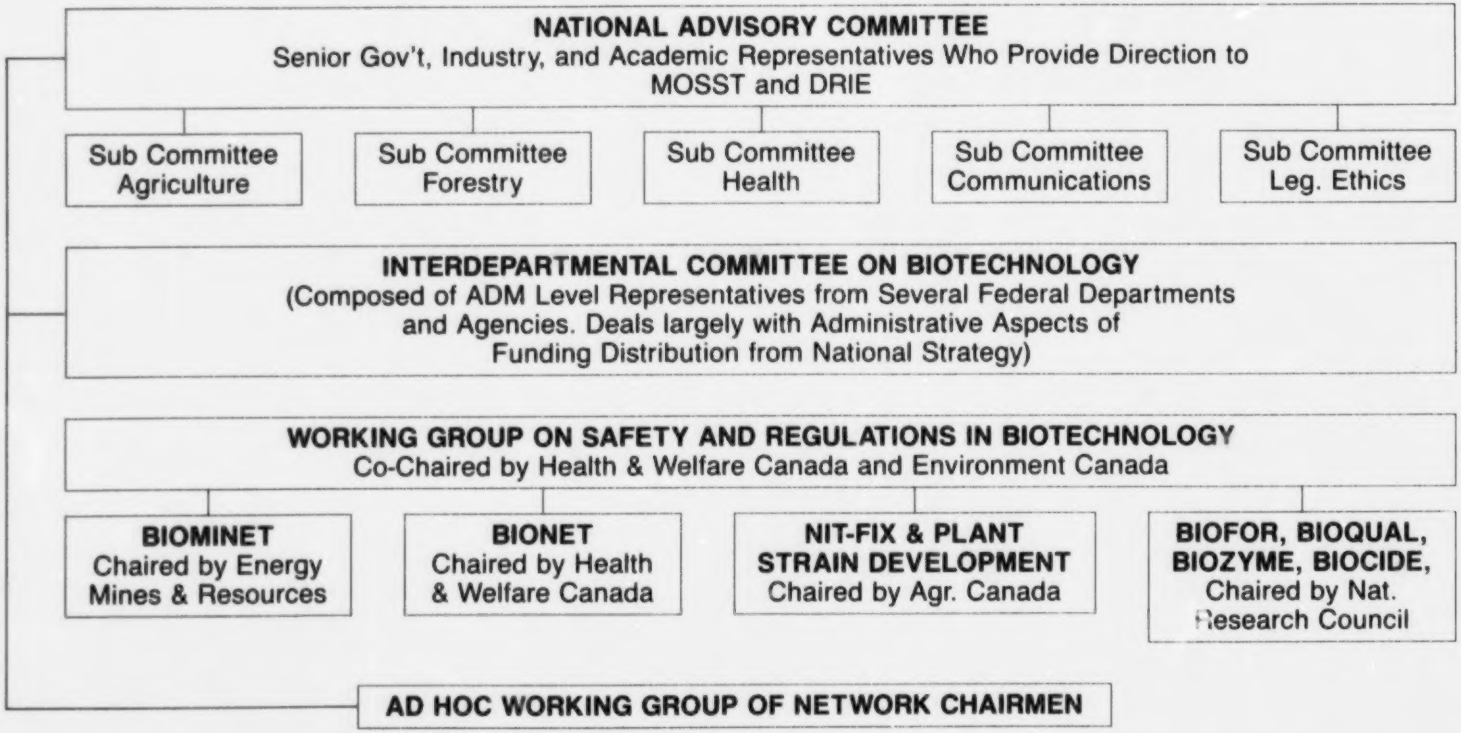
NATIONAL ADVISORY COMMITTEE
Senior Gov't, Industry, and Academic Representatives Who Provide Direction to MOSST and DRIE
Sub Committee Agriculture
Sub Committee Forestry
Sub Committee Health
Sub Committee Communications
Sub Committee Leg. Ethics
INTERDEPARTMENTAL COMMITTEE ON BIOTECHNOLOGY
(Composed of ADM Level Representatives from Several Federal Departments and Agencies. Deals largely with Administrative Aspects of Funding Distribution from National Strategy)
WORKING GROUP ON SAFETY AND REGULATIONS IN BIOTECHNOLOGY
Co-Chaired by Health & Welfare Canada and Environment Canada
BIOMINET
Chaired by Energy Mines & Resources
BIONET
Chaired by Health & Welfare Canada
NIT-FIX & PLANT STRAIN DEVELOPMENT
Chaired by Agr. Canada
BIOFOR, BIOQUAL, BIOZYME, BIOCIDE,
Chaired by Nat. Research Council
AD HOC WORKING GROUP OF NETWORK CHAIRMEN

CHART 2

POTENTIAL BENEFITS FROM APPLICATIONS OF GENETIC ENGINEERING TO AGRI/FORESTRY

- Decrease nitrogen fertilizer input by conferring nitrogen fixing ability on non-legumes or by increasing the nitrogen assimilating ability of nitrogen fixing microbes.
- Increase the amount of land under cultivation and increase marginal land usage.
- Increase tolerance of plants to environmental stresses (e.g., salts, pests, drought, frost, pollutants).
- Enhance development of underexploited crops for multiple end uses (feed, fuel, fiber).
- Improve yields in agriculture and silviculture by hastening cultivar selection and development.
- Increase crop uniformity and decrease culling of grains and vegetables.
- Improve nutritional value of seeds, fruits, and vegetables.
- Decrease cost of crop production.
- Decrease dependence on foreign supplies of oil and make farming less energy intensive.
- Enhance competitiveness of pioneer plant and microbial species (re-vegetation).
- Decrease pollution and eutrophication of aquatic environments caused by pesticide and fertilizer run-off.
- Create new agricultural products (e.g., encapsulated pesticide-degrading microbes).
- Decrease use of chemical pesticides by construction of effective microbial insecticides.
- Expand basic knowledge of gene structure, function, and regulation and the molecular mechanisms that control plant productivity.

POTENTIAL BIOHAZARDS

Produce more vigorous weeds, and thus increase development and use of herbicides.

Alter the niches and pathogenicities of plant viruses and soil bacteria.

Increase breakdown of fertilizer and increase production of nitrogen oxides (denitrification).

Increase rate of organic matter decomposition in the soil.

Decrease the range and variability of some crops, thereby inadvertently increasing disease susceptibility.

Source: Levin, M., *et al*, *Applied Genetic Engineering, Future Trends and Problems*, Park Ridge, New Jersey: Noyes Publications, (1983) p.51.

CHART 3

POTENTIAL BENEFITS FROM APPLICATIONS OF GENETIC ENGINEERING TO MINING SECTOR

Coal cleaning

Methane adsorption

Destruction of troublesome organics in metallurgical systems

Biosorption of both valuable elements and wastes by dead organisms

Bioaccumulation

Heat recuperation from exothermic reactions

Biodecomposition of wastes

POTENTIAL BIOHAZARDS

Bacterial leaching operations generate large quantities of sulfuric acid which, if poorly contained, could seriously contribute to the acidification of fresh water supplies.

Thiobacilli and related bacterial species are not known to be pathogenic in man or animal. However, increased use of such microbes on an industrial scale (resulting in greater exposure to human population) may select for bacterial strains that have acquired the ability to infect humans.

The use of bacteria to concentrate metals from dilute waste streams or settling ponds entails the risk that metals will accumulate in the food chain. Even though metal ions such as mercury and silver are highly toxic to bacteria, it is through microbial action that mercury, for example, is transformed into organic compounds that are responsible for mercury toxicity in higher forms of life.

Source: Levin, M. *et al op. cit.* (1983)

CHART 4

POTENTIAL BENEFITS FROM APPLICATION OF GENETIC ENGINEERING TO PHARMACEUTICALS

Infectious disease and cancer diagnostics.

Potential for mass production of human biologicals such as interferon, insulin, human and animal growth hormones.

Veterinary and plant diagnostics.

Development of new vaccines (*i.e.*, research currently is focused on immunization against hepatitis, influenza).

Tissue typing.

Bacterial production of chemical intermediates.

Drug susceptibility of pathogens.

Production of monoclonal antibodies.

POTENTIAL BIOHAZARDS

The application of biotechnology to the pharmaceutical industry gives rise to potential hazards at several levels of activity:

The research laboratory where scientists and technical personnel engage in the initial stages of developing new drugs, therapeutic agents, etc. A potential risk arises from the creation of new microbial strains via recombinant DNA techniques which will first be experienced by laboratory personnel. (Historical incidences of such infection among lab workers are higher than their frequency in the general population; however, local communities surrounding microbial facilities appear to be at no greater risk than general population).

The production facility, where large scale manufacturing, production, isolation, and packaging processes are undertaken. The area of greatest potential risks is exposing the workplace (and to a lesser extent the surrounding community) to aerosols containing viable microorganisms. Although production workers' health is monitored quite closely, the workers themselves are less able than highly trained lab personnel to recognize symptoms of microbial infection.

The end users, including medical personnel and patients of drugs produced through genetic engineering techniques. (Risks here appear to be minimized by fairly stringent regulations in place pertaining to introduction of new drugs and biologicals and strict control of quality control by manufacturers).

CHART 5

POTENTIAL APPLICATIONS OF GENETIC ENGINEERING IN POLLUTION CONTROL AND WASTE TREATMENT

Biomass production

Mineralization

Fermentation
    Methane
    Organic acids
    Intermediates

Product/Byproduct recovery
    Dehalogenation
    Deamination
    Denitration
    Ring cleavage

Other areas
    Rate enhancement
    Increase specificity
    Resistance to inhibition

From J.W. Patterson, Illinois Institute of Technology

POTENTIAL BIOHAZARDS

Potential for harmful effects from the release (both open and accidental) of viable micro-organisms in the workplace and the environment.

Potential environmental impacts from the discharge of high strength organic effluents, particulate and organic atmospheric emissions.

Disposal of sludges from biological waste treatment, product recovery, or purification processes.

CHART 6

POTENTIAL BENEFITS FROM APPLICATION OF GENETIC ENGINEERING TO CHEMICAL PRODUCTION

- Oxidation of alkenes to alkene oxides (end products are utilized in enormous quantities for plastic manufacture).
- Use of microbes as a source of biological catalysts (enzymes) in industrial processes (e.g. proteases, carbohydrases).
- Production of organic chemical feedstocks utilizing fermentation technology (chemical industry in U.S. heavily dependent upon petroleum).
- Significant role anticipated for manufacture of high priced specialty chemicals or in synthesizing new chemicals that have no practical alternative route.

POTENTIAL BIOHAZARDS

- Species of micro-organisms likely to be utilized in the chemical industry differ from those in the pharmaceutical industry. For example, various species of Pseudomonas, Acinetobacter and Flavobacteria may find application in mediating chemical processes. However, many of these microbes are opportunistic pathogens in man; that is, they infect skin lesions or cause severe infections in individuals who are already weakened by pre-existing ailments.
- The chemical industry is accustomed to the application of biological processes as a business enterprise. Commercial scale fermentation facilities are alien to this industry and as such, technology may be purchased rather than developed in-house capabilities.
- The chemical industry has a poorer record than the pharmaceutical sector in areas related to worker safety and environmental protection. This discrepancy may reflect the grossly different commercial operations performed by these two industries rather than neglect. Nevertheless, one might be apprehensive of the introduction of a new technology into an industry where, historically, hazards have surfaced only after serious harm was done to workers. (Levin, M.A., *et al* 1984)

CHART 7

POTENTIAL BENEFITS FROM APPLICATIONS OF GENETIC ENGINEERING TO ENERGY PRODUCTION

- Utilization of biomass which is renewable, flexible through crop switching and adaptable through genetic manipulation.
- Utilization of other organic material (industrial and municipal wastes) which poses a broad range of problems associated with disposal.
- Injection of microbes into oil fields to reduce oil's viscosity, or act to mobilize tightly bound oil and facilitate recovery of oil.
- Use of microbial processes for extracting tar and oil lodged in tar sands. (This process could generate oil without the extensive ore crushing, retorting, or environmental damage associated with traditional recovery methods.)
- Desulfurization of crude oil and coal.

POTENTIAL BIOHAZARDS

- Processes designed to convert wood, wood waste, etc., into substrates suitable for ethanol fermentation entail an initial hydrolysis step which can be accomplished either chemically or biologically. As the biological conversion process is not yet fully developed, commercial processes employing chemical conversion are expected to continue with the concommittant large quantities of acid wastes.
- The species of micro-organisms likely to be utilized in enhanced oil recovery schemes Pseudomonas and Acinetobacter are the same as those expected to be used in chemical production. As previously mentioned, these microbes are potentially serious pathogens in man.
- Established energy companies are not accustomed to dealing with biological systems as a means of producing energy. These companies will be compelled to strengthen their technical competence in areas related to biological applications as commercial projects for bioenergy brighten (Zaugg, R., and Swarz. *op. cit.* 106).
- The production of sufficient ethanol in Canada to have significant impact on domestic fuel supplies will require the diversion of enormous quantities of food crops, particularly corn, limiting availability of grain for livestock feed.
- The prospect that cellulosic material may serve as suitable feedstocks for biofuel production forewarns of large scale deforestation.

ROLE OF THE FEDERAL GOVERNMENT – JAN FERGUSON

DR. TUOHY

Our final speaker for this section of the program is Janet Ferguson from the Ministry of State for Science and Technology. In 1980 Janet joined the staff of the Science Council of Canada and spent several years doing policy research on a range of issues including science education in Canada and the relationship between education in science and technology and access to the labour market. In 1984 she moved to the Ministry of State for Science and Technology (MOSST) to work on federal policy to support and develop biotechnology in Canada, known as the National Biotechnology Strategy. As part of that strategy, the ministry is responsible for ensuring that the regulatory regime is adequate to deal with the products and processes of biotechnology. She will discuss the role of the federal government in regulating biotechnology.

MS. FERGUSON

In light of what the last two speakers have said, there is not a lot left for me to say.

We have heard a lot about the federal government's role in developing and regulating biotechnology. You may, at this time, want to know why someone from a small central agency (MOSST) with a purely policy function, no operational mandate and certainly no regulatory function, is talking to you about regulation in biotechnology.

Two years ago the federal government identified biotechnology as a 'strategic technology' for Canada. There were two reasons for doing that:

1) The applications of biotechnology are extremely broad, crossing many sectors. You have heard many examples of the broad applications of biotechnology here today.
2) Secondly, biotechnology has very special and major implications for the natural resource industries which are still, at this time, Canada's economic mainstay. Therefore, there is reason for us to believe that we would ignore biotechnology at our economic peril.

The federal government has two major concerns about biotechnology. The first is development – getting biotechnology off the ground, making sure the climate for industry is appropriate, making sure research is adequately funded, and so on. Secondly, in line with its regulatory responsibilities, the government must make sure that public health and the environment are adequately protected from potential hazards, hopefully without discouraging commercial and scientific development.

The 'National Strategy' is the name applied to the policy or the plan that the federal government put in place to address these concerns.

As many people have already mentioned today, biotechnology is still very much in the research phase. Its first products are just beginning to reach commercial markets. Canada, compared to many other countries – the

United States, Japan, Western Europe, has been rather slow to get involved in biotechnology. We lack strength in several key areas of science upon which biotechnology relies for its development. Therefore, some government action is called for if we really believe that biotechnology is critical to our economic future.

The National Strategy identified four priority areas for Canada, which have already been described by Mr. McIntyre. It puts in place measures designed to:

1) build the science base in each key area. You cannot go anywhere in biotechnology until you have the necessary scientific resources – active researchers and teachers in the university and industry sectors; and to
2) create a climate conducive to industrial investment in biotechnology in Canada. This covers a whole range of issues, from proprietary rights to the regulatory regime. Because, in fact, the kind of regulatory regime we adopt in this country will have a very significant impact on industry's interest in doing research and development in this field in Canada.

It was recognized at the time when the biotechnology policy was established that specific comprehensive regulations could not be drafted. The issues, problems and concerns that may arise in connection with biotechnology have not yet been fully identified.

As a result of the uncertainty and unpredictability of future developments, the strategy simply stated that the Ministry of State for Science and Technology – which is the agency responsible for implementing the strategy – should take action to ensure that the regulatory regime keeps pace with the development of biotechnology.

Today, as in 1983, when the policy was put in place, biotechnology is still very much a research activity, and, as Claire Franklin has already noted, the Medical Research Council has developed guidelines to cover MRC funded research in this field. These guidelines have been extended and adopted by a variety of other funding agencies, such as the Natural Sciences and Engineering Research Council. Most scientists and funding agencies involved in biotechnology at the research phase have voluntarily adopted the Medical Research Council guidelines.

However, we have reached the stage where we are starting to see research results being moved towards commercialization. It is widely recognized that we should start to look at a broader regulatory framework which will encompass the industrial and agricultural applications of biotechnology and may involved large-scale development and open release of organisms.

The problem is complicated in Canada by the existence of at least two levels of government with differing responsibilities for regulation (municipalities may also be involved.) With respect to any particular application, the jurisdiction of the two levels of government is often not totally clear. Even at the federal level, divisions of responsibility between departments are not always clear. Therefore, the ministry decided that the first step should be to clarify what laws, regulations, guidelines and policies are in place at present, both federally and provincially, to regulate biotechnology.

As a result, the Interdepartmental Committee on Biotechnology decided, in December 1984, to establish a Working Group on Safety and Regulation to prepare an 'inventory' of existing federal and provincial legislation. During the last six months, in co-operation with the provinces, Environment Canada has been co-ordinating this project on behalf of the group. They have been developing a matrix which identifies legislation currently on the books; indicates whether or not it applies to biological products and processes; and assesses how it is likely to be interpreted and applied. This information should give us a sense of where we are today in terms of regulating biotechnology. The study will also attempt to identify where there are gaps in the legislation, i.e., where we have problems which may not be addressed by existing legislation.

I believe that this inventory is a necessary first step towards a consideration of the need for new regulations or new laws.

An additional step will involve looking at the various policy issues which surround regulation of biotechnology. Several of these issues have been alluded to or discussed in other presentations today. Since we are dealing with a situation which involves two levels and a variety of different departments of government, I believe it is important that we try to develop a 'Canadian' way of approaching biotechnology in order to avoid, where possible, the problems of different governments and different departmentsadopting different policies. For example, it would simplify life for many companies if all provinces and departments would adopt the same approach to the issue of whether or not we should treat genetically engineered organisms differently from naturally occurring organisms.

Because of the complex issues of government jurisdiction in this country, our approach must be to work together and try to achieve some kind of consensus on how Canada should respond to these issues. At this time the Ministry of State for Science and Technology is looking at different options for developing policy on the range of issues that are going to arise with regard to biotechnology.

Hopefully, these will be discussed with provincial representatives at a joint federal-provincial meeting on biotechnology being planned for the spring of '86. This summarizes the present position of the federal government with regard to the regulation of biotechnology. We are really just beginning. It is interesting to note that, in the last five to six months, the level of concern expressed by Canadian industry about the lack of clarity in regulations for biotechnology has escalated. More and more often, in recent months, concern has been expressed by people from industry that they do not know how the government is going to approach the regulation of these various new products and processes. I think that it is an indication of the stage of maturity of the field. Biotechnology has proceeded to a point where industry sees significant possibilities for using it in a commercial capacity, and is now turning to government and saying, 'Tell us how we are going to do this and what you are going to require of us so that we know where we should focus our research and development dollars.'

To summarize, there are five specific things that the federal government should be responsible for in the area of regulation. The first two are relatively obvious.

1) We have to be responsible for our federally administered regulations.
2) We have to be responsible for the policy that these federal agencies use in applying those regulations.
3) We have, I believe, a role to play in encouraging a consistency in the approach adopted by the provinces and by the federal government.
4) I think we also have a role to play in trying to make sure that our regulatory regime is at least somewhat consistent with other countries. Differences in approach between ourselves and the United States and Europe frequently create quite significant trade barriers. Without necessarily adopting the same regulatory standards as other countries, I think we should attempt to harmonize the approach that we take. If we adopt similar risk assessment criteria, for example, we can develop ways of exchanging testing data and information and so on, which can significantly reduce the costs of applying regulations.
5) Finally, I believe that the problem of public education that has been discussed several times today is a very real one. If we are concerned about Canada making progress in biotechnology, we have to make sure that there is public acceptance of that technology. We have to ensure that a significant number of people get enough good information to be able to evaluate and understand what is going on in research and industrial development. Therefore, we have to look for ways to provide both the public and industry with opportunities to have an input regarding the procedures that are put in place to make the decisions about what regulations will be and how they will be applied.

There are different approaches to regulation being adopted in different countries. Australia has instituted new legislation to control biotechnology, and they have recently published guidelines. The OECD, as has been mentioned before, has been attempting to encourage member countries to get together to adopt a common approach in this field.

I believe the federal government's role in regulating biotechnology is, first, to put its own house in order and, second, to encourage a consistent approach at the federal and provincial levels and at the international level. If you have any questions, I would be happy to answer them.

SUMMARY – JOHN EVANS

DR. TUOHY

The chairman of the panel this afternoon needs no introduction, Dr. John Evans from Allelix and from the National Biotechnology Advisory Committee.

DR. EVANS

Several themes of the discussion today give cause for enthusiasm or worry.

Dr. Mustard disturbed me this morning when he suggested that industry should pay for all the process (testing, etc.) in relation to biotechnology. Who is 'industry' in this situation? It is important to point out that, at present, many of the new developments in Canada will occur in small companies. Some of the processes may later be adapted and be very important to 'industry', but, at this stage, you are not dealing with the big industries that can put up five, 10, 15 million dollars to do the kinds of tier testing being described. Following Dr. Slotin's last remark, I think it is important to look carefully at the kind of load one can expect small industry in this country to carry. As Dr. Walmsley pointed out, we do not have the big pharmaceutical and chemical industries that are south of the border, i.e., we do not have the infrastructure to carry the weight. Therefore, we are likely to have to depend largely on relatively small, fragile companies that, at this stage, will not have a revenue stream from products in the market. If you impose a heavy financial load, I think that you will put them out of business.

Secondly, I think it is important to ask 'Is it the product that is the important element?' The risks that we are concerned about are associated with the manipulation of genes. There is the potential for a variety of different products from gene manipulation. Therefore, when you are trying to do the screening you have to assess the adverse consequences of the new step that has been added. Claire Franklin, for example, made the point that she distinguished between Category 1 and Category 2. They are both genetically altered, but one has a potential that is more suspicious than the other because something 'foreign' has been added.

The potential hazard might be manifested ultimately in a variety of different products. The same enzyme that is produced from a genetically-altered micro-organism might be used to power three or four different processes. If you go back to Dr. Mustard's original suggestion, the question becomes 'Who is going to be responsible for the testing?' If it is the group that designed the initial genetic manipulation, that is one thing; but if it is somebody else who produces the product – that may be five, seven, eight years downstream. So, personally, I don't think that it is realistic with this time frame and these actors to impose such requirements in the regulations.

The second point that I would like to make is that almost every thing that has been brought up as a hazard today is a hazard of biological processes in general. Not one hazard has been mentioned yet that is specific to genetic engineering, except the public awareness hazard, which is a real problem. The public is legitimately concerned because biotechnology is meddling with the basis of life, and nobody can dismiss concerns with absolute certainty. With respect to this issue, I would like to make three points:

First is the importance of public education, openness and support of constructive examination of these issues. I think it is not only in the public interest, but also in industry's interests and in the scientific interest that these issues are examined.

Secondly, with one exception, the problems described today can all be handled by the regulations with which we are already familiar, i.e., the regulation of biological processes. The one exception is release of genetically altered organisms to the environment.

Thirdly, we are creating undue apprehension by treating biotechnology as something completely new. As Lew Slotin said, biotechnology is a term that has been coined to describe a variety of new techniques that improve biological processes. The biological processes are not new.

Turning from the substance to the process of regulation, there is a special problem for small new companies. There is a morass of regulations and a multitude of departments potentially involved with biotechnology. The great concern of people on the commercial side is that their product or process is going to get lost or delayed; it is going to get pushed from one department to another; that there will be no jurisdictional boundary; that one will not know how to deal with the mechanics of regulation and clearance; that guidelines on how to apply for clearance will not have been set up because the agencies do not know exactly how these new types of applications should be handled.

The cost of delay to a small company trying to introduce its first products can be lethal. Most of the small industries are on borrowed money or limited budgets, with refinancing on an annual basis – with a year or two of regulatory delay, they could go under.

Establishing a regulatory framework and drafting rules is a difficult job, but I believe that, so far, there has not been any priority given by the federal government to move on this task. It has been passed to an interdepartmental committee. The groups are trying to do what they can, but I do not believe that there is anybody senior in the federal government who has said, 'It is important to have these results by such and such a date; therefore, allocate the people, time and resources to make that possible.' Until that happens, I think there will continue to be confusion in the federal departments and increasing anxiety in the provincial departments. Added to this there is the issue of trying to ensure that there is communication and harmonization of regulations between the federal and provincial levels of government.

Dr. Walmsley noted that, at the recent meeting of the National Biotechnology Advisory Committee in Alberta, there was a serious suggestion from Alberta representatives that that province should fill the vacuum and move ahead independently to establish regulations. It will be harder to undo such regulations, once established, if they are inappropriate.

For these reasons I would recommend:

1) urgent resolution of the regulatory framework respecting, on the one hand, safety issues and the interests of the public and, on the other, the need of commercial groups to know what is expected of them when they apply for clearance and the appropriate entry point so applications do not get bounced from pillar to post;
2) improved communication between the two levels of government and consultation with the public and with those who will be subject to the regulations.

It would be preferable to avoid interim regulations since they sustain the element of uncertainty, but interim standards are less uncertain than nothing. A uniquely Canadian approach is not necessary. Other countries are moving quickly in this area, and there is a great deal to learn from their experience. The OECD studies and the U.S. developments provide information which could expedite the process.

Turning specifically to occupational health and safety, there is already an extensive body of experience dealing with biological hazards. The challenge is to adapt existing guidelines and regulations and obtain assurance of compliance at the provincial level. The problem is manageable administratively because only a few commercial entities outside universities and hospital research laboratories are using recombinant DNA. The nature of use and assessment of risk could be handled easily, and a mechanism for notification could be established for new actors on the scene.

Martin O'Connell and Tony Mazzocchi have cautioned that we should not rely on regulation alone. In order to get the compliance of workers and management, they have to understand that avoiding problems is largely their responsibility. This raises the issue of what kind of training should be provided for people in the workplace, for safety officers and for the managers. Most companies have safety officers designated, but do they have the best information the province can provide to help them with their duties?

The question of technical capability to review situations has been raised. In view of the small number of assessments necessary at this time, it may be preferable to contract out to MRC or other groups rather than develop it 'in house' in the ministry.

For communicating with the constituency, it would be very valuable to have a guidebook or road map of government agencies and ministries involved with the various aspects of biotechnology and individuals who should be contacted.

Both levels of government should consider their role in public education. Although individual industries probably will undertake this responsibility, industry associations probably will not be regarded as objective, and it will fall to the public sector to provide a balanced program of public education.

What principles should guide the provincial role in occupational health and safety and the federal approach to regulatory issues? The first principle should be to build on what we have already rather than to create something new, and, from what has been stated by the participants today, that should not be difficult. In future, the existing structure should be modified or broadened as necessary. This approach has the advantage of familiarity to those being regulated and to those responsible for implementing the process.

The second principle concerns communication and consultation among agencies and ministries of government, between levels of government, with the public and with those who will be regulated. There is a gap now – and some mechanism is required to ensure ongoing communication because none of the issues are static; things keep changing.

The third principle concerns timing. The uncertainty about regulation is a major problem for industry. Operating guidelines would allow industry to assess whether a product is going to encounter specific tests or long delays, factors of great importance to the decision to pursue product development and the ability to raise venture funding. Knowledge of regulatory requirements is essential for industries to plan sensibly.

Commercialization of the new biotechnologies could give Canadians a chance to participate in sectors in which they have not been represented in the past. But, as Lewis Slotin pointed out, it is a fragile instrument at this stage, and decisions on regulation by governments will play a significant role in determining whether Canadian commercial ventures can compete in an important sector of economic development and whether the diverse public interests can be effectively served.

Thanks very much.

Follow up Correspondence to Previous Advisory Memorandum 83-IV

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May 14, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
400 University Avenue
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Toronto, Ontario
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Dear Dr. McCalla:

In March 1984, Council submitted to me an Advisory Memorandum entitled, "New Chemical and Biological Agents in the Workplace: Identification and Control of Carcinogens and Potential Carcinogens". This Memorandum contains recommendations relating to policies and procedures to be adopted to prevent the introduction of potentially carcinogenic new agents in the absence of proper control measures.

As you indicated in your letter which accompanied the Memorandum, Council conducted an extensive review of background information and public submissions in attempting to reconcile the often very different positions and opinions put forward by various parties on this complex topic. You will therefore appreciate the need for a careful and thorough review, by my officials, of the detailed recommendations contained in the Memorandum.

This review has identified a number of significant technical and policy issues which require further clarification and discussion before a final response can be prepared. These include:

- the recommendation that all new chemical and biological agents be tested for potential carcinogenicity prior to introduction into the work place;
- the recommendation that all toxicological data on mutagenicity and potential carcinogenicity be submitted to the Ministry as it becomes available after the pre-market notification;
- the recommendation that the Minister of Labour ensure that there is appropriate inspection of approved laboratories;
- the recommendation that new agents classified in Category 1 or 2 not be used if a suitable non-carcinogenic alternative is available; and

- the recommendation that a maximum exposure limit be set at a level which, according to the best available evidence, will not cause an increased incidence of cancer in exposed workers.

I believe that a meeting between Task Force members and appropriate Ministry staff to discuss these matters would result in a better understanding of the implications of the recommendations, and would assist in the preparation of a formal response. If this course of action is agreeable, please contact Dr. Robinson to arrange the meeting.

Thank you for your cooperation.

Yours sincerely,

Russell H. Ramsay
Minister

Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
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May 24, 1985

Dr. A. E. Robinson
Assistant Deputy Minister
Ministry of Labour
400 University Avenue
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Toronto, Ontario
M7A 1T7

Dear Dr. Robinson:

Mr. Ramsay, in his letter dated May 14th, suggested a meeting between task force members and appropriate ministry staff to clarify and discuss certain issues contained in Advisory Memorandum 83-IV.

The Advisory Memorandum represented the council's advice on New Chemical and Biological Agents in the Workplace Identification and Control of Carcinogens and Potential Carcinogens, hence the members of council who were on the task force are prepared to meet with you and appropriate ministry staff to hear your concerns and better understand the type of clarification and discussion requested. It is anticipated that following this initial meeting council will be in a better position to decide whether a broader forum is required to discuss the specific concerns.

Yours truly,

D. R. McCalla

D. R. McCalla
Chairman

c.c.: R. G. Elgie
T. E. Armstrong, Q.C.
B. Goodman

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October 24, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue
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Toronto, Ontario
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Dear Dr. McCalla:

I am now in a position to respond further to Council's Advisory Memorandum 83-IV on "New Chemical and Biological Agents in the Workplace: Identification and Control of Carcinogens and Potential Carcinogens", submitted to my predecessor, the Honourable Russell H. Ramsay. The recent meeting between Task Force members and Ministry staff proved to be most useful in clarifying some of the complex issues involved, and has enabled my officials to complete their review of the recommendations.

The Advisory Memorandum contains two major recommendations. The first is a general recommendation that:

> ".....the Minister of Labour take the necessary steps to develop, as expeditiously as possible, policies and procedures to identify and control the use of new chemical and biological agents which pose a carcinogenic risk in the workplace, and, at the same time, co-ordinate these efforts with those of the federal government, other Canadian jurisdictions, the governments of Canada's major trading partners and international agencies."

The second major recommendation sets out specific requirements to be incorporated into the policies and procedures for identification and control of potentially carcinogenic new substances. I propose to respond, in this letter, to the first of these recommendations, and to certain major policy issues arising from the second recommendation.

Development of Policies and Procedures

The central recommendation of Council on this issue is that policies and procedures be developed to identify and control the use of new chemical and biological agents which pose a carcinogenic risk in the work place.

I would first of all refer to the policies and procedures that already exist. The Occupational Health and Safety Act (the Act) provides a framework for the control of new chemical and biological agents, including potential carcinogens. Section 21 of the Act requires that a notice be submitted to a Director of the intention to manufacture, distribute or supply any new chemical or biological agent. Procedures for notification under this section are in place and require that all relevant physico-chemical data and all available toxicological data on the new agent be submitted to the Director of the Occupational Health Branch. Where in the opinion of the Director, the introduction of the new agent may endanger the health or safety of workers, the Director shall require the notifier to provide further information including the matters referred to in section 28(i)(1) of the Act. Also, a variety of control measures are available to protect the health of workers exposed to new agents. Section 20 of the Act provides for the prohibition, limitation or restriction of the use of any agent or combination of agents in a work place. This section is available in respect of new agents. Alternatively, such agents may be prescribed as designated substances under section 41 of the Act or may be controlled under section 145 of the Regulations for Industrial Establishments.

While these provisions differ in certain ways from the recommendations contained in the advisory memorandum, the existing scheme is designed to ensure the protection of workers from all potential hazards to health, including carcinogenicity, which may be associated with the introduction of new agents into the work place. In fact, it is difficult, and some contend, unrealistic, to deal with the issue of potential carcinogens among new agents in isolation. Great care must be taken, particularly in the allocation of resources, to ensure that all potential hazards associated with chemical and biological agents are adequately addressed. It is important, therefore, to consider many of Council's recommendations in the context of an overall policy for the control of potential hazards to health. A policy for the control of potential occupational carcinogens is under active development by my officials at present, and will soon, I hope, be ready for discussion with Council. A final resolution of some of the issues raised in your advice including the use of an expert committee and the criteria for classification of agents, will be dealt with in this broader policy initiative.

Co-ordination with other Jurisdictions

I fully appreciate the need to minimize the burden on manufacturers, distributors and suppliers of new agents, by standardizing, to the extent possible, the reporting requirements for such agents. At present, Ministry staff liaise with staff administering the federal Environmental Contaminants Act, and the U.S. Toxic Substances Control Act. The Organization for Economic Cooperation and Development (OECD) guidelines on toxicological testing are used in a flexible manner as guidelines for Ontario. Ministry staff have participated in the federal/provincial Workplace Hazardous Materials Information System Project.

These and other initiatives ensure that the Ministry is aware of the policies and procedures of other jurisdictions, and that Ministry policy is consistent with the best existing in other jurisdictions. It is noteworthy that the Federal Government is now considering significant amendments to the Environmental Contaminants Act to conform with recent OECD initiatives with respect to information needs, exchange of confidential data, and other related topics. These changes will be carefully examined by my officials.

Amendment of the Act

Implementation of Council's recommendations would appear to require amendment of the Occupational Health and Safety Act. Most notably this includes the recommendation that all new agents be tested for potential carcinogenicity prior to introduction into the work place.

At present, use of a new agent may begin once a Director has been notified. There is no provision which prevents use of a new agent until testing of the agent, or evaluation of the test results by the Ministry, is complete. However, the Director may prohibit use or intended use of the agent under section 20, if in his opinion, its presence in the work place or the manner of its use is likely to endanger the health of a worker.

In view of the importance of Council's recommendations, not only for potential carcinogens, but for all potentially toxic new agents, and in view of the federal initiative to review the Environmental Contaminants Act, and the international efforts to harmonize reporting requirements for new substances, the Ministry is now considering amendments to the notification scheme under section 21. I shall keep you informed of the progress of this initiative.

I wish to thank you and your colleagues for the work involved in the preparation of the Advisory Memorandum, and I hope that it will result in the development of better and more efficient means of protecting the health of workers exposed to new chemical and biological agents in the work place.

Sincerely,

William Wrye
Minister

Follow up Correspondence to Previous Advisory Memorandum 84-II

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
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May 9, 1985

The Honourable R.H. Ramsay
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Ramsay:

Following receipt of your letter of January 9 and that of Dr. Robinson of January 18, 1985 (attached), council met with Dr. Robinson to obtain a clearer understanding of issues on which clarification was being sought.

The first of these related to definitions of reproductive hazard and reproductive risk and the parameters of council's Advisory Memorandum 84-II concerning reproductive hazards in the workplace. In the context of that document, *reproductive hazard* refers to a substance or agent which is considered to cause an adverse reproductive effect in humans. *Reproductive risk* refers to the probability that exposure to a substance or agent will cause an adverse reproductive effect.

Council was concerned with both pre-conception and post-conception and had felt that it was clear that the advisory memorandum addressed reproductive hazards with respect to both men and women.

It is acknowledged that hazards to the breastfed child are not a part of reproductive hazards per se and in the advisory memorandum reproductive hazards are generally differentiated from hazards to the breastfed child. However, issues relating to breastfeeding were seen as a logical and direct extension of issues raised during council's consideration of workplace hazards which may affect the offspring of exposed workers and so the nursing child is included in what the document refers to as the 'reproductive chain'.

Dr. Robinson raised with council questions with respect to interpretation of animal and human data, criteria to be applied to arrive at a 'single most protective standard', and how to proceed where there is a deficiency of scientific information.

Council acknowledges the complexity of the task facing the ministry in dealing with those issues; dimensions of which are not unrelated to those encountered by the ministry in the development of regulations for the control of toxic substances in general. Council wishes to stress, however, that it did not set out to answer those specific questions in that advisory memorandum. The emphasis in the document was on process and on policies and procedures and their impact on individuals. Council was concerned about the importance of adhering to a presumption in favour of a 'single most protective standard', exclusionary policies and their impact, and mechanisms for ensuring that appropriate attention is directed to the negative effects of moving away from a single most protective standard. The deficiency of scientific data and the considerable uncertainty associated with reproductive hazards have influenced the treatment of this issue in the workplace and make it particularly important that the broad range of implications be adequately considered.

Intended purposes of council's recommendation 84-17 concerning workplace assessments were described in some detail in the advisory memorandum. It is not clear to council, however, the extent to which the purposes cited are now met under the current designated substance regulations.

I trust the foregoing and the meeting with council have served to provide clarification of the advisory memorandum.

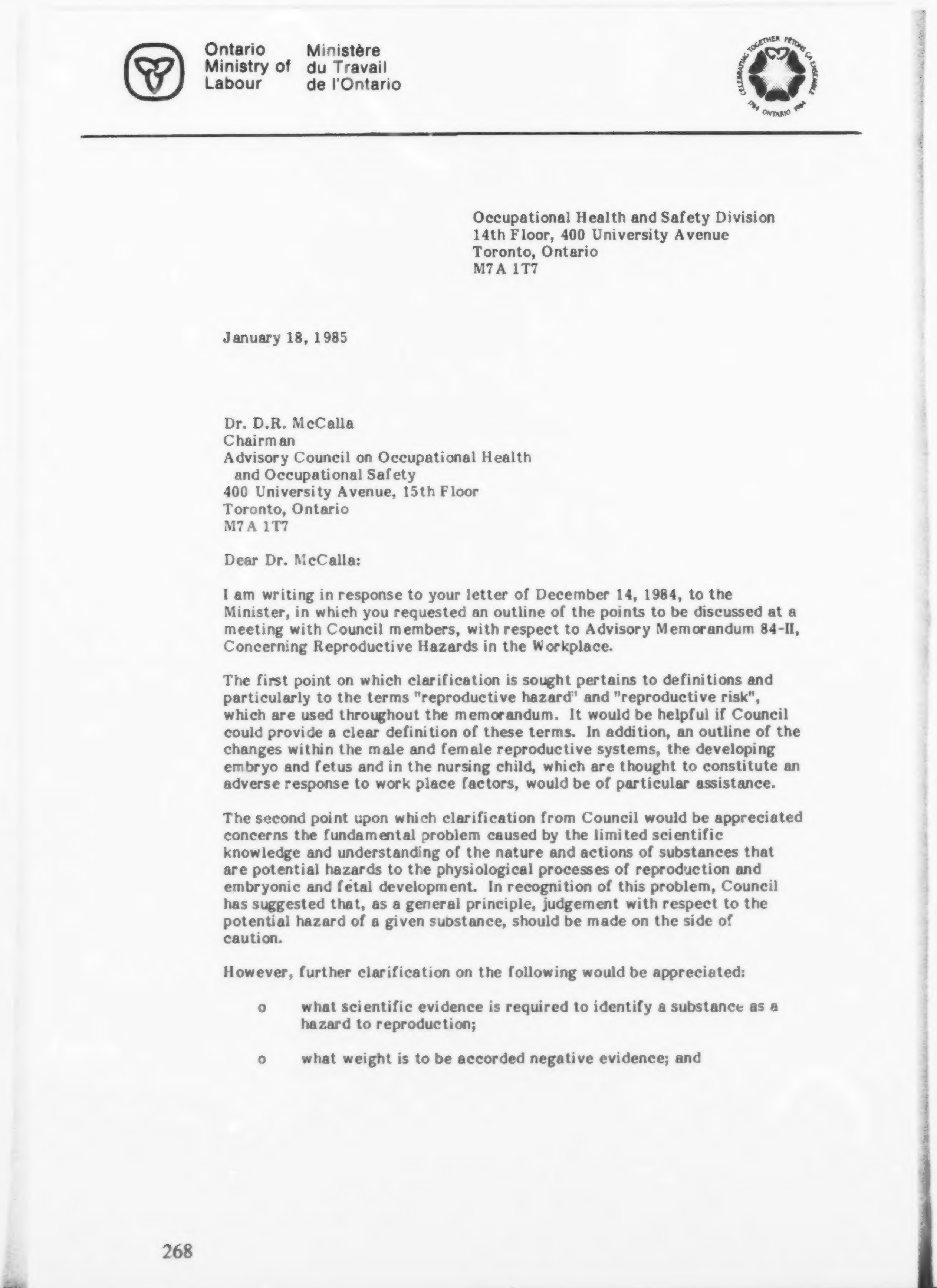
Yours truly,

DRMcCalla

D. R. McCalla
Chairman

Attachment

cc to: T.E. Armstrong, Q.C.
Dr. A.E. Robinson
B. Goodman



Ontario Ministry of Labour
Ministère du Travail de l'Ontario

Occupational Health and Safety Division
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January 18, 1985

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
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Dear Dr. McCalla:

I am writing in response to your letter of December 14, 1984, to the Minister, in which you requested an outline of the points to be discussed at a meeting with Council members, with respect to Advisory Memorandum 84-II, Concerning Reproductive Hazards in the Workplace.

The first point on which clarification is sought pertains to definitions and particularly to the terms "reproductive hazard" and "reproductive risk", which are used throughout the memorandum. It would be helpful if Council could provide a clear definition of these terms. In addition, an outline of the changes within the male and female reproductive systems, the developing embryo and fetus and in the nursing child, which are thought to constitute an adverse response to work place factors, would be of particular assistance.

The second point upon which clarification from Council would be appreciated concerns the fundamental problem caused by the limited scientific knowledge and understanding of the nature and actions of substances that are potential hazards to the physiological processes of reproduction and embryonic and fetal development. In recognition of this problem, Council has suggested that, as a general principle, judgement with respect to the potential hazard of a given substance, should be made on the side of caution.

However, further clarification on the following would be appreciated:

- what scientific evidence is required to identify a substance as a hazard to reproduction;
- what weight is to be accorded negative evidence; and

- how should the available animal and human data be interpreted.

Finally, with respect to the recommendations set out in the memorandum, I would ask Council for clarification of the intent of, and rationale for, Recommendation 84-17. It is unclear how Recommendation 84-17 will serve the purposes cited in the memorandum to any greater extent than already served under the current structure of designated substance regulations.

I look forward to discussing these points in greater detail at an early meeting with Council members.

Yours sincerely,

E. Robinson

A. E. Robinson
Assistant Deputy Minister

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August 12, 1985

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
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Dear Dr. McCalla:

My officials in the Occupational Health and Safety Division have completed their review of Council's Advisory Memorandum 84-II concerning reproductive hazards in the work place. They have responded to each of Council's recommendations separately in the attached document entitled "Response of the Occupational Health and Safety Division to ACOHOS Recommendations 84-10 to 84-17".

Council's discussion is valuable and provides direction, however, there is the fundamental problem associated with the lack of factual information and definitive evidence relating a substance or agent to an adverse effect on reproduction which must be addressed. The initial phase in policy development must be to establish the criteria upon which to conclude that a particular substance or agent is a hazard to reproduction, either in the male or the female. Council has referred to the need to protect the "most vulnerable link" in the reproductive chain. Because of the limited scientific research in this area and the complexity of the problem presented by this recommendation, the Ministry is considering the establishment of an expert committee to define and to provide advice in identifying those agents against which protection should be provided.

It must be emphasized however that in the development of all designated substance regulations, there has been deliberate consideration of the actual or potential health effects of each substance on the reproductive physiology in males and females. This aspect of the adverse effects of substances on health has and is considered not only for potential designated substances but for all other substances where control strategies are being or have been developed.

As indicated in my official's response to Council's Recommendation 84-14, I will raise with the Chairman of the Worker's Compensation Board, the issue of compensation for pregnant workers who may be exposed to substances which have been identified as being a hazard to the unborn child and who cannot be assigned alternative work.

I note Council's intention to provide further advice on the consultative process in the development of regulations and I trust that this will be forthcoming at an early date. The Ministry is appreciative of Council's advice in dealing with some very complex issues in an important area of public policy.

Sincerely,

Bill

William Wrye
Minister

RESPONSE OF
THE OCCUPATIONAL HEALTH AND SAFETY DIVISION
TO
ACOHOS RECOMMENDATIONS 84-10 TO 84-17
CONTAINED IN
ADVISORY MEMORANDUM 84-II
CONCERNING REPRODUCTIVE HAZARDS IN THE WORK PLACE

The Advisory Council has presented a number of recommendations concerning reproductive hazards in the work place. The responses of the staff of the Occupational Health and Safety Division are given below. It is important to note that in responding to Council, these recommendations proceed on the presumption that the potential hazards to reproduction and the adverse reproductive effect they cause have been defined and identified. As this is not the case, it should be realized that the Ministry of Labour must address this fundamental problem in the initial stage of policy development.

ACOHOS RECOMMENDATION 84-10

> that the Minister of Labour, in establishing standards for substances and agents which are reproductive hazards, follow the principle that there be a presumption in favour of a single 'most protective' standard for all workers, set at a level which protects the most vulnerable link in the reproductive chain.

In principle, the adoption of the concept of a single most protective standard for all workers is the preferred means of controlling worker exposure to any hazard, including reproductive hazards in the work place, since it provides for maximum protection in a non-discriminatory manner. The Ministry supports this, in principle, and will give serious consideration to the establishment of a single 'most protective' standard during the development of future regulations where there is sufficient scientific knowledge to provide the basis for such a standard.

As Council is aware, the concept of the single most protective standard assumes a reasonable degree of certainty in the definition of an exposure limit below which an adverse reproductive effect is not likely to occur. Because of the lack of scientific data, it may be difficult to define an exposure limit (other than zero) that is protective of all components of the reproductive chain.

ACOHOS RECOMMENDATION 84-11

> that the Minister of Labour, in circumstances where economic and/or technological factors may mean that a 'most protective' standard is not feasible or practical for a substance or agent which is a reproductive hazard,
>
> - demonstrate the economic and/or technological infeasibility or impracticality of such a standard,
> - examine the risks and costs inherent in alternative options, including potential discriminatory effects and compensation costs, and
> - solicit comments on the above before choosing an alternative measure.

With the assistance of the Advisory Council, and with input from labour and management, the Ministry of Labour has developed a consultative process for the development of designated substance regulations. As part of this process the Ministry solicits input from all interested parties and provides ample opportunity for comments or meetings with Ministry officials to discuss views or to provide more information to assist in decision making. Normally the basis for decision making is clearly stated at each step, and at every decision point in the process there is provision for public input.

Where there is a sound scientific basis for its development and the 'most protective' standard has not been adopted, it is understood that the Ministry would have to justify its decision and report on its findings. In addition, before an alternative method of control was adopted, the Ministry would be expected to consider the inherent risks and costs including the potential discriminatory effects with any additional costs that would be incurred.

ACOHOS RECOMMENDATION 84-12

> that the Minister of Labour take the necessary steps to ensure that, in the development of work place exposure standards for reproductive hazards for which it is demonstrated that it is not feasible to establish a 'most protective' standard, consideration be given to the application of further additional measures designed to reduce exposure levels below those stipulated in the standard.

As Council is aware, the Ministry of Labour has included in regulations pertaining to designated substances that are known human carcinogens, a provision requiring employers to reduce worker exposure to the lowest practical level as well as ensuring that the ambient air criteria stipulated are not exceeded.

These provisions were included with the aim to encouraging employers to keep up-to-date with and where possible, adopt and implement, technological advancements that will improve work place conditions and further reduce worker exposure. The Ministry will consider including a provision to this effect in the development of future regulations where the substance is suspected to be a potential hazard to reproduction in humans.

ACOHOS RECOMMENDATION 84-13

> that the Minister of Labour take steps to ensure, where it is demonstrated that a pregnant worker may be exposed to a reproductive hazard at a level which may be injurious to the fetus, and where the achievement of exposure levels protective of the fetus is not economically or technologically feasible, that employers be required to offer pregnant workers alternative work, if available, at appropriate compensation; and

ACOHOS RECOMMENDATION 84-14

> that the Minister of Labour consult with the Workers' Compensation Board and/or other government agencies to establish arrangements that would ensure, where it is demonstrated that a pregnant worker may be exposed to a reproductive hazard under conditions as set out in ACOHOS Recommendation 84-13 and where alternative work is not available, that the pregnant worker will be entitled to take leave from the work place at appropriate compensation.

By definition, 'fetus' refers specifically to the unborn offspring in the post-embryonic period, which in man is the period from seven to eight weeks after fertilization until birth. It is believed that Council's recommendation was intended to provide protection to the unborn child from the time the pregnancy is confirmed which may be at the embryonic stage of development.

The Minister of Labour is to consult with the Chairman of the Workers' Compensation Board on the question of compensation for pregnant workers who may be exposed to potential reproductive hazards in the work place. It should be realized however, that the adoption of such a policy does not protect the unborn child before the pregnancy is detected nor does it provide protection from hazards which may affect male and/or female gametes and reproductive organs adversely. In fact, the application of such a policy may be viewed as discriminatory in the absence of adequate scientific information to determine that the unborn child is, indeed, at greater risk.

It is worth noting that, in Quebec, hazards of an ergonomic nature form the basis of 60% of the claims made to the Commission de la santé et de la securité du travail (CSST) by pregnant or breast-feeding workers exercising their right to protective reassignment under the Quebec Act (CSST Annual

Report, 1983). As Council can appreciate, inclusion of ergonomic considerations may further complicate the protection of the pregnant worker since these hazards may be unique to the individual worker performing a particular task.

It should be noted also that the issue of 'protective reassignment' is much broader than discussed in Council's memorandum. In Quebec, the right to protective reassignment is not restricted to pregnant workers and nursing mothers. Workers in general, are granted this right under section 32 of the Quebec Act. For this Ministry to extend the right to protective reassignment only to a select group of workers may lead to discriminatory practices. For these reasons, the Ministry will address in its discussions with the Chairman of the Workers' Compensation Board, the question of the extension of compensation benefits to workers in general, under certain circumstances where they are unable to perform their regular duties due to a condition extant in the work place which may jeopardize their health or capacity to reproduce.

ACOHOS RECOMMENDATION 84-15

> that the Minister of Labour take the necessary steps to make it a requirement that all workers who are employed in areas where they may be exposed to substances or agents which are reproductive hazards or hazardous to a breast-fed child shall be so informed initially and on a regular basis.

Sections 14 and 16 of the Occupational Health and Safety Act contain certain provisions requiring that an employer shall:

(a) provide information, instruction and supervision to a worker to protect the health or safety of the worker;

(c) acquaint a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device, equipment or a biological, chemical or physical agent; (section 14(2)(a) and (c));

and that a supervisor shall:

(a) advise a worker of the existence of any potential or actual danger to the health or safety of the worker of which the supervisor is aware;
(b) where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for the protection of the worker; and
(c) take every precaution reasonable in the circumstances for the protection of a worker. (section 16(2)(a), (b) and (c)).

In addition, where a joint health and safety committee has been established in accordance with section 8 of the Act, the committee under section 8(6)(d) may obtain information from the constructor or employer respecting:

(i) the identification of potential or existing hazards of materials, processes or equipment, and
(ii) health and safety experience and work practices and standards in similar or other industries of which the constructor or employer has knowledge.

In order to enhance worker access to information about potentially hazardous agents in the work place, the Ministry is currently working on "right-to-know" legislation that will ensure the provision of sufficient appropriate information relating to potential hazards to health.

ACOHOS RECOMMENDATION 84-16

> that the Minister of Labour keep, within the Ministry, updated information on the effects of reproductive hazards and hazards to the breast-fed child and make such information available on request.

The Ministry of Labour has an extensive library available to the public which keeps current information on all aspects of occupational health. The library produces bibliographies on selected topics. Attached to this response are copies of the bibliographies relating to reproduction and occupational health. The Canadian Centre for Occupational Health and Safety (CCOHS) also provides information services which are offered at no expense and are available to the public through a terminal network established by the Ministry of Labour.

ACOHOS RECOMMENDATION 84-17

> that the Minister of Labour take steps to ensure that work place assessments required in accordance with designated substance regulations (currently sections 6 and 8), in future, include a statement as to which jobs, if any, would be considered to include exposure to a reproductive hazard at levels in excess of the 'most protective' level and which would necessitate differential treatment in respect of the employment or placement of men, women capable of bearing children, or pregnant or breast-feeding women.

It is felt that Council's recommendation has already been provided for in current legislation regarding designated substances. Assuming that the designated substance is a known reproductive hazard, and that the assessment discloses that the health of a worker may be affected thereby, the employer by virtue of section 7 (section 8 in the isocyanates regulation) in the designated substance regulations is required to control the exposure of the affected worker(s) and develop and put into effect a control program. It would seem logical that, unless the program involves the entire plant, a statement of the affected work station(s) covered by this control program be included. Where differential treatment of workers is necessary for their protection, this should be defined in the control program.

It has already been established that, for the purposes of section 23 of the Act, no distinction is to be made between the unborn child and the mother. Extending this interpretation to the designated substance regulation, that which affects the health of the unborn child would be considered as affecting the health of the worker and therefore the exposure must be controlled to ensure protection for both. It is not certain that the provisions of the Occupational Health and Safety Act and the designated substance regulations provide for the protection of the breast-fed child of a working mother. This issue will be explored by the Ministry's legal branch to determine whether or not the protection of the breast-fed child of a worker falls within its jurisdiction, and if so what action, if any, should be taken by the Ministry.

Follow-up Correspondence to Previous Advisory Memorandum 84-IV

Ontario

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Ministry
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November 4, 1985

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue
15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of April 22, 1985 submitting to my predecessor Advisory Memorandum 84-IV - Concerning Policies and Principles for Dealing with Literacy and Occupational Health and Safety. I am pleased to see that the task force recognizes the efforts that have taken place to reduce illiteracy. However, I agree that a great deal more needs to be done in this area. As you are no doubt aware, this Ministry has worked on several projects with the Ministry of Citizenship and Culture to provide information on health and safety to immigrants. This Ministry is also represented on the Tri-Ministerial Advisory Committee on Occupational Health and Safety which promotes safety education in the public school system by reviewing submissions with respect to health and safety content of proposed community college programs.

Despite the paucity of data to assist the task force in preparation of its report, the recommendations and support documents provide a great deal of information and advice on how to deal with the pervasive problem of illiteracy and its impact on occupational health and safety matters. The report points out that a substantial proportion of the Ontario out-of-school population have less than grade nine education, many of whom are over-represented in 'high risk' industries such as fishing, forestry, agriculture, mines, construction, manufacturing and transportation. It further notes that reading materials relevant to occupational health and safety were analyzed and found to be written above grade ten level. My Ministry has responsibility for the health and safety of workers in several of these sectors. Therefore, I intend to support all efforts to reduce illiteracy in the work place because this is crucial to the success of the internal responsibility system, and the enlightened participation of workers in the recognition, evaluation and reduction of work place hazards. I will also instruct my staff to undertake a review of new and existing reading materials relevant to occupational health and safety to ensure that these materials are understandable by the people for whom they are intended.

I have forwarded a copy of your memorandum to the Ministers of Education, Colleges and Universities, Skills Development, Citizenship and Culture, Community and Social Services, and the Occupational Health and Safety Education Authority of the Workers' Compensation Board, and have invited their Assistant Deputy Ministers and other appropriate officials to participate at a meeting to be held during the fall, to discuss the recommendations of your memorandum. My staff will take the initiative in convening the meeting. These meetings will be followed up by meetings with relevant agencies, committees, unions, educational groups, and other volunteer groups which are concerned with health and safety, literacy, and second language instruction for adults.

Please extend my thanks to the members of the Council and the task force who worked so diligently on this memorandum.

Sincerely,

Bill

William Wrye
Minister of Labour

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Office of the
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400 University Avenue
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December 17, 1985

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Wrye:

Thank you for your letter of November 4, 1985 in response to council's Advisory Memorandum 84-IV - Concerning Policies and Principles for Dealing with Literacy and Occupational Health and Safety.

If you have no objections, because of interest which has been expressed, I would like to make your letter of response available to the public.

Yours truly,

D.R. McCalla
Chairman

cc to T.E. Armstrong
Dr. A.E. Robinson
B. Goodman

Ontario

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January 30, 1986

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dennis
Dear Dr. McCalla:

I write in response to your letter of December 17th relating to council's Advisory Memorandum 84-IV - Concerning Policies and Principles for Dealing with Literacy and Occupational Health and Safety.

I have no objections to your making my letter of November 4, available to the public. I should advise that, due to legislative and other commitments of the various Ministries, the meeting of officials referred to in my earlier letter of November 4, 1985 could not be held in the fall but has been scheduled for February 13th.

Yours sincerely,

Bill

William Wrye
Minister

Ontario

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March 5, 1986

Dr. D. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

RE: Advisory Memorandum 84-IV: Concerning Policies and Principles for Dealing with Literacy and Occupational Health and Safety

In my letter to you on 4 November 1985 I indicated that a meeting of appropriate senior officials of other Ministries of the Provincial Government would be convened to discuss the recommendations of the above captioned memorandum.

This meeting, the first of several planned, was held on 13 February 1986. To gain a general perspective on the types of Adult Basic Education (ABE) and English as a Second Language (ESL) programs which are already available through the sponsorship of the various Ministries, a sub-committee has been established with a mandate to prepare a listing of all adult literacy and second language programs, along with the specifics of delivery agencies, locations and times at which these programs are offered, and their funding sources. The inter-Ministry group will reconvene, towards the end of April 1986, to receive the report of the sub-committee and to develop a program plan to upgrade workplace literacy skills, which are crucial to the health and safety of the workers of this Province.

.../2

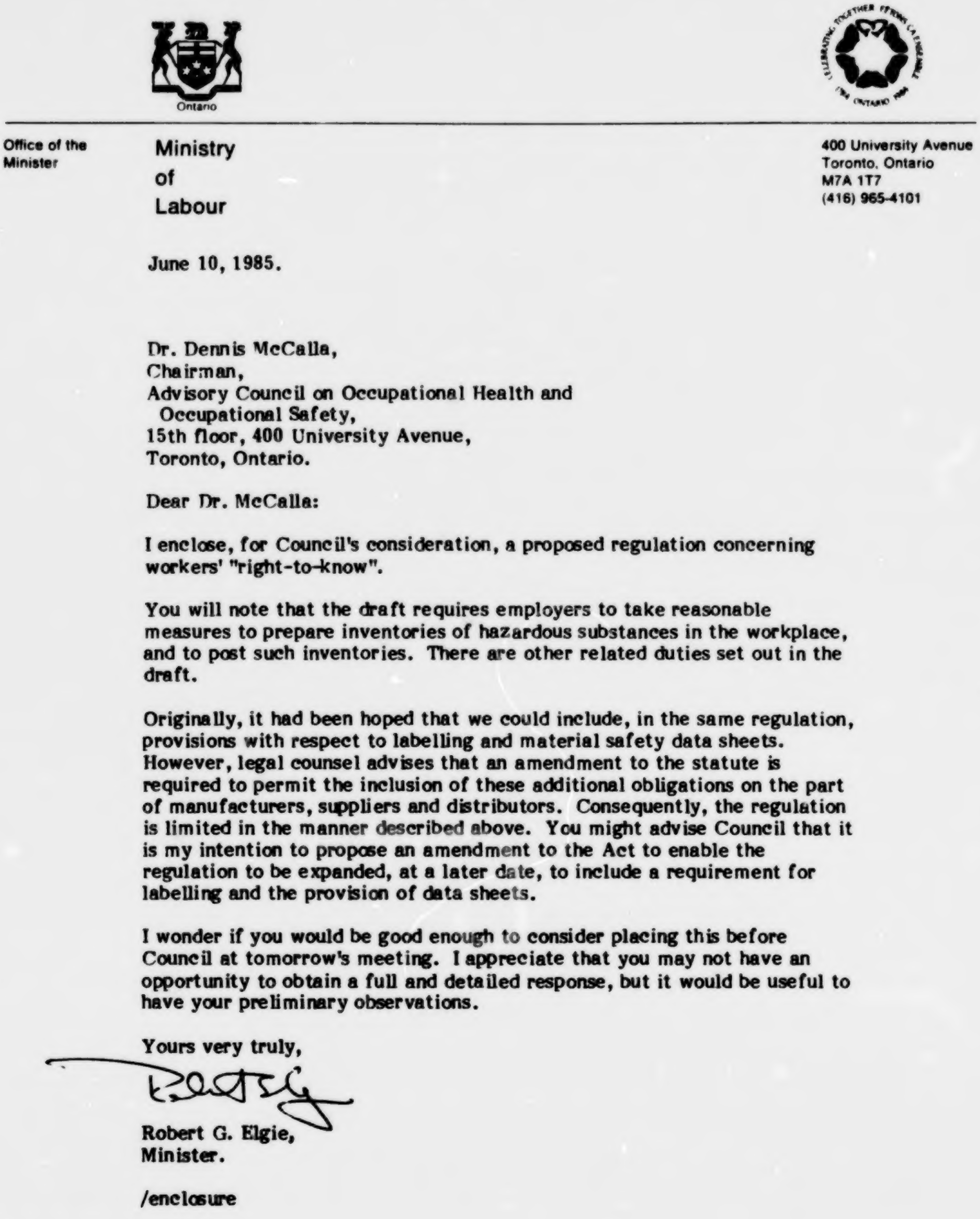
The difficult and exceptionally delicate task of identifying workers who are disadvantaged by the absence of basic literacy skills is further complicated by the multiplicity of languages in use in the workplace. A fundamental decision respecting the language(s) in which literacy upgrading may be offered, will need to be made prior to proceeding with an implementation plan. I shall of course keep Council advised on progress towards resolution of these important issues.

Yours sincerely,

William Wrye
Minister

Other Correspondence

i) Correspondence concerning 'right-to-know'



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June 10, 1985.

Dr. Dennis McCalla,
Chairman,
Advisory Council on Occupational Health and
Occupational Safety,
15th floor, 400 University Avenue,
Toronto, Ontario.

Dear Dr. McCalla:

I enclose, for Council's consideration, a proposed regulation concerning workers' "right-to-know".

You will note that the draft requires employers to take reasonable measures to prepare inventories of hazardous substances in the workplace, and to post such inventories. There are other related duties set out in the draft.

Originally, it had been hoped that we could include, in the same regulation, provisions with respect to labelling and material safety data sheets. However, legal counsel advises that an amendment to the statute is required to permit the inclusion of these additional obligations on the part of manufacturers, suppliers and distributors. Consequently, the regulation is limited in the manner described above. You might advise Council that it is my intention to propose an amendment to the Act to enable the regulation to be expanded, at a later date, to include a requirement for labelling and the provision of data sheets.

I wonder if you would be good enough to consider placing this before Council at tomorrow's meeting. I appreciate that you may not have an opportunity to obtain a full and detailed response, but it would be useful to have your preliminary observations.

Yours very truly,

Robert G. Elgie,
Minister.

/enclosure

1. In this Regulation, "hazardous substance" means,

   (a) a substance listed in the Schedule to this Regulation;

   (b) a mixture containing a substance listed in the Schedule to this Regulation.

2. (1) Every employer shall take reasonable measures to identify and then cause an inventory to be made in writing of every hazardous substance identified that is produced, used, handled, or stored in a work place to which a worker is likely to be exposed.

   (2) The inventory mentioned in subsection (1) shall be completed not later than six months after the day this Regulation comes into force.

   (3) The inventory shall identify the chemical or generic name of the hazardous substance.

3. For each substance on the inventory, every employer shall undertake a review to identify the processes, occupations and work stations in or at which exposure of a worker to the substance may occur.

4. The inventory and review shall be prepared in consultation with the joint health and safety committee, if any, and where no such committee exists, in consultation with a worker selected by the workers to represent them for the purposes of this Regulation.

5. In causing the inventory and review to be made, an employer shall make every reasonable effort to ascertain the hazards to health likely to result from exposure to the hazardous substance and the precautions to be taken in respect of the hazardous substance and shall comply with the duties imposed by clauses 14(2)(a) and (c) of the Act.

6. The inventory and review shall be amended or revised from time to time when a hazardous substance not listed therein is produced, used, handled, or stored, or when a hazardous substance listed therein is no longer produced, used, handled, or stored, and in any event, the employer shall cause the inventory to be reviewed annually and the provisions of sections 3, 4, and 5 shall apply.

7. A copy of the inventory and review, and of an amendment or revision thereto, or an annual review thereof, shall be posted in a conspicious place in the work place and shall be furnished to the joint health and safety committee, if any, or a worker selected by the workers to represent them for the purposes of this Regulation.

Advisory Council on Occupational Health & Occupational Safety
Conseil consultatif de la santé et de la sécurité au travail
Ontario

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June 12, 1985

The Honourable Robert G. Elgie, M.D.
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Dr. Elgie:

This is in response to your letter of June 10, 1985 regarding the proposed regulation concerning the worker's 'right-to-know'.

Council notes that the proposed regulation addresses two related issues: 1) the onus on employers to maintain an inventory of hazardous substances in the workplace and to review the conditions of their use; and 2) the disclosure of this information to workers.

As to the first of these issues, council notes with pleasure the similarity between the proposed regulation and council's recommendations 85-3, 85-4 and 85-5 in Advisory Memorandum 85-I, forwarded to you on May 28, 1985.

As to the second issue, council has supported the general concept of the worker's right-to-know. For example, in ACOHOS recommendation 83-7 council recommended *inter alia* that, for workplaces using new chemical or biological agents which are carcinogens or potential carcinogens, the Minister of Labour ensure that inventories of, and material safety data sheets for, these substances are available to workers; and that the information provided to workers is up to date and contains all the information on properties and health effects that the worker should know and understand while dealing with these agents.

As you are undoubtedly aware, the draft proposals of the Workplace Hazardous Materials Information System (WHMIS) project are expected to be made public imminently. Council believes that the WHMIS proposals, having been developed jointly by labour, management and both federal and provincial levels of government, offer the most practical basis for the development of legislation relating to the dissemination of information on hazardous substances in the workplace. Council, therefore, would trust that the present proposal is intended to lay the groundwork for the implementation of WHMIS in the Ontario context.

Upon receiving clarification of the relationship of this proposal to the WHMIS project, council would be pleased to comment further.

Yours truly,

DRMcCalla

D. R. McCalla
Chairman

c.c.: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
Mr. B. Goodman

Ontario

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August 26, 1985

Dr. Dennis McCalla
Chairman
Advisory Council of Occupational
Health and Occupational Safety
15th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

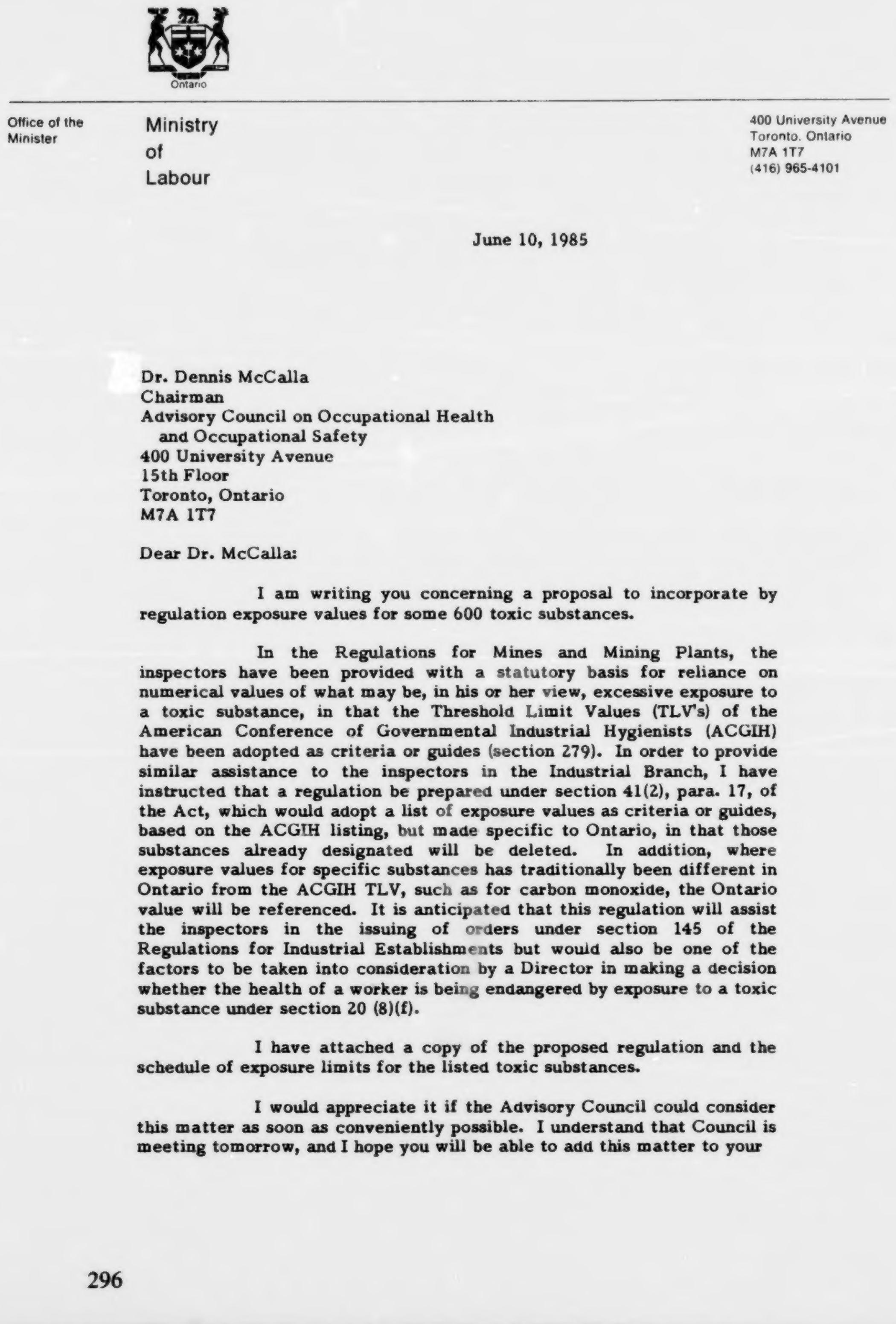
I refer to the correspondence between Dr. Elgie and Council relating to the draft regulation proposed by the previous government requiring employers to prepare inventories of hazardous substances used in the workplace. I note Council's support of this initiative but also note its concern that the initiative should not conflict with the Workplace Hazardous Materials Information System (WHMIS) project, but should lay the groundwork for the implementation of WHMIS in the Ontario context.

As Council will be aware, the Liberal government is committed to implementing worker "right-to-know". My officials are critically reviewing the Final Report of the WHMIS project, which has now been received. Upon completion of this review in early autumn, I will be in a better position to indicate the path that Ontario will be following to ensure that workers are properly advised of the hazards of toxic substances used in the workplace.

Yours sincerely,

William Wrye
Minister

ii) Correspondence concerning proposal to adopt list of exposure values



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June 10, 1985

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue
15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I am writing you concerning a proposal to incorporate by regulation exposure values for some 600 toxic substances.

In the Regulations for Mines and Mining Plants, the inspectors have been provided with a statutory basis for reliance on numerical values of what may be, in his or her view, excessive exposure to a toxic substance, in that the Threshold Limit Values (TLV's) of the American Conference of Governmental Industrial Hygienists (ACGIH) have been adopted as criteria or guides (section 279). In order to provide similar assistance to the inspectors in the Industrial Branch, I have instructed that a regulation be prepared under section 41(2), para. 17, of the Act, which would adopt a list of exposure values as criteria or guides, based on the ACGIH listing, but made specific to Ontario, in that those substances already designated will be deleted. In addition, where exposure values for specific substances has traditionally been different in Ontario from the ACGIH TLV, such as for carbon monoxide, the Ontario value will be referenced. It is anticipated that this regulation will assist the inspectors in the issuing of orders under section 145 of the Regulations for Industrial Establishments but would also be one of the factors to be taken into consideration by a Director in making a decision whether the health of a worker is being endangered by exposure to a toxic substance under section 20 (8)(f).

I have attached a copy of the proposed regulation and the schedule of exposure limits for the listed toxic substances.

I would appreciate it if the Advisory Council could consider this matter as soon as conveniently possible. I understand that Council is meeting tomorrow, and I hope you will be able to add this matter to your agenda for preliminary consideration. It would be helpful to know whether you agree in principle with this proposal.

I look forward to an early response.

Yours sincerely,

Robert G. Elgie
Minister

Att.

REGULATION MADE UNDER THE OCCUPATIONAL HEALTH AND SAFETY ACT

Exposure Values Adopted for Biological, Chemical or Physical Agents

1. The exposure values for biological, chemical or physical agents as set out in the Schedule to this Regulation are adopted as criteria or guides,

   (a) for the purposes of clause 20(8)(f) of the Act, and

   (b) for the purposes of determining that measures and procedures are required to be taken as prescribed by section 145 of Regualtion 692, Revised Regulations of Ontario, 1980.

Advisory Council on
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June 12, 1985

The Honourable Robert G. Elgie, M.D.
Minister of Labour
400 University Avenue, 14th Floor
TORONTO, Ontario
M7A 1T7

Dear Dr. Elgie:

This is in response to your letter of June 10, 1985 regarding the proposed regulation concerning the adoption of exposure values for biological, chemical or physical agents.

Council agrees that it is desirable to move in the direction of providing a clearer and legislatively firmer basis for the control of a broad range of toxic substances in the workplace. Council further agrees that the ACGIH list of Threshold Value Limits provides the best currently available comprehensive list of recommended exposure limits.

As to the particular proposal on which you requested its views, council wishes to have more information regarding the following points:

1) the extent to which the schedule of exposure limits, which has not yet been forwarded to council, will diverge from the ACGIH list, and the rationale for these divergencies;

2) the extent to which the Ministry of Labour has consulted or intends to consult more broadly regarding both the principle entailed in this regulation and the substance of the schedule;

3) proposed mechanisms for the updating and periodic review and revision of the schedule.

Council will be in a better position to comment in more detail on this proposed regulation once this additional information is available. As you know, council is currently engaged in a review of alternatives to designation as a means of controlling toxic substances and will also be commenting on these matters in that broader context.

Yours truly,

D. R. McCalla
Chairman

c.c.: T. E. Armstrong, Q.C.
Dr. A. E. Robinson
Mr. B. Goodman

iii) Correspondence concerning proposed ethylene oxide regulation

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400 University Avenue
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March 4, 1986

Dr. Dennis McCalla
Chairman
Advisory Council on Occupational Health and
Occupational Safety
15th Floor
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I am pleased to forward the proposed Ethylene Oxide Regulation for Council's review and comment.

I have reviewed with my officials, the question of whether the time weighted average exposure limit of 1 ppm considered at the open review meeting held in September 1985 could be lowered in response to the concerns expressed by labour representatives. My officials and I concur that the risk to health is reduced as the amount of worker exposure to ethylene oxide is reduced.

I requested my officials to consider whether a prosecution of a lower exposure limit could be supported by existing measurement and analytical methods. Any exposure limit stipulated by law must be enforceable to be credible. My officials advise that with the current measurement and analytical method, the lowest sustainable exposure limit is 1 ppm. I have asked my officials to research and investigate other methods. As a result, I have decided not to include a lower exposure value at this time. Of course employers will, in any event, be required to reduce exposure to the lowest practical level.

I understand that technology is developing rapidly in this field, so I have asked my officals to schedule a review of the ethylene oxide regulation in three years from the date the regulation takes effect, to consider whether a lower exposure limit could be sustainable in law and to implement the lowest supportable limit at that time.

As you will note, the proposed regulation has been revised following the open review meeting. The significant change arises from the Ministry's consideration of the Advisory Council's advice on medical surveillance. Ministry officials have considered the nature of the health effects from exposure to ethylene oxide and the benefits to be derived from a mandatory medical surveillance program. Mandatory medical surveillance conducted on a routine and periodic basis will provide no useful information to the worker or the employer with regard to any of the health effects which may derive from exposure to ethylene oxide at levels mandated under this regulation.

In keeping with Council's earlier advice that the parties be informed of changes made to the regulation following the public meeting, my officials will send a notice to interested parties explaining the change made to the regulation, and enclosing a copy of the proposed regulation along with a summary of comments received following the public meeting.

I look forward to receiving Council's advice on this proposed regulation in the near future.

Yours sincerely,

William Wrye
Minister

ADMINISTRATION

Legal Mandate of The Advisory Council

Section 10, the Occupational Health and Safety Act.

Advisory Council on Occupational Health and Occupational Safety
10.—(1) There shall be a council to be known as the Advisory Council on Occupational Health and Occupational Safety composed of not fewer than twelve and not more than twenty members appointed by the Lieutenant Governor in Council on the recommendation of the minister.

Term of office of members
2) The members of the advisory council shall be appointed for such term as the Lieutenant Governor in Council determines and shall be representative of management, labour and technical or professional persons and the public who are concerned with and have knowledge of occupational health and occupational safety.

Chairman and vice-chairman
3) The Lieutenant Governor in Council shall designate a chairman and a vice-chairman of the advisory council from among the members appointed.

Vacancies
4) The Lieutenant Governor in Council may fill any vacancy that occurs in the membership of the advisory council.

Remuneration and expenses
5) The remuneration and expenses of the members of the advisory council shall be determined by the Lieutenant Governor in Council and shall be paid out of the moneys appropriated therefor by the legislature.

Powers of advisory council
6) The advisory council, with the approval of the minister, may make rules and pass resolutions governing its procedure, including the calling of meetings, the establishment of a quorum, and the conduct of meetings.

Idem
7) The function of the advisory council is and it has power,
a) to make recommendations to the minister relating to programs of the ministry in occupational health and occupational safety; and
b) to advise the minister on matters relating to occupational health and occupational safety which may be brought to its attention or be referred to it.

Annual report
8) The advisory council shall file with the minister not later than the 1st day of June in each year an annual report upon the affairs of the advisory council.

Idem
9) The minister shall submit the report to the Lieutenant Governor in Council who shall cause the report to be laid before the assembly if it is in session or, if not, at the next ensuing session. 1978, c. 83, s. 10.

Primary objective of advisory council

To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary objectives of advisory council

1. To ensure as far as is possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as is possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as is possible that there is appropriate manpower training and development for the occupational health and safety field.

5.* To review periodically the effectiveness of the policies and programs implemented to achieve secondary objectives 1 to 4.

Terms of reference of advisory council

1. To make recommendations on matters referred to it by the minister, submitted to it by interested parties or pursued by the council on its own initiative.
2. To advise the minister on programs in the field of occupational health and safety.
3. To advise the minister on policies, principles and procedures used in standard setting and in the development of guidelines to be used by the government.
4. To review and make recommendations to the minister on the introduction of new substances such as chemicals into the workplace.
5. To review and make recommendations on the detection, measurement and control of occupational health and safety hazards in the workplace.
6. To review and make recommendations about the arrangements for occupational health and safety for groups and areas where there are no formal health and safety programs or the programs are judged to be inadequate.
7. To advise the minister on priorities for research and development in occupational health and safety.
8. To advise the minister on priorities for manpower training and development in the field of occupational health and safety.
9. To prepare an annual report to the minister, which shall include the advisory memoranda, recommendations of the council and the government response.

*added June 1980

Meetings of the Advisory Council

April 9, 1985
May 14, 1985* **
June 11, 1985
July 30, 1985*** †
September 10, 1985
October 8, 1985
January 14, 1986††
February 11, 1986††
March 11, 1986

* Discussion with management and union representatives about the application of the internal responsibility system in The Algoma Steel Corporation.
** Discussion with deputy minister and ministry staff.
*** Discussion with minister.
† Discussion with ministry staff.
†† Pending Order-in-Council appointing new members/reappointing members to council, participation at this meeting was based on council membership as at October 1985.

TASK FORCES

TASK FORCES OF ADVISORY COUNCIL ON OCCUPATIONAL HEALTH AND OCCUPATIONAL SAFETY

TASK FORCE ON PRINCIPLES AND PROCEDURES FOR SETTING STANDARDS AND REGULATIONS

Terms of Reference (Original)
To establish guidelines by which council can determine the appropriateness of the principles, policies and procedures used in setting the standards and regulations in occupational health and safety in Ontario.
To include such things as the development of the regulations and public input about those regulations.

Membership for the Review of the Process Used in the Development of the Proposed Regulation Respecting Asbestos on Construction Projects and in Building and Repair Operations

Council Members
J.W. Charters
J. Duffy
W.K.C. Morgan
D. Dewees
L. Heard – Chairman
D. Smith

Meetings Held
September, 24, 1985
October 7, 1985*

Reports to Council
October 8, 1985

Resulting in
Advisory Memorandum 85-III

Membership for the Review of the Process Used in the Development of the Proposed Regulation Respecting Arsenic

Council Members
D.R. McCalla
W.K.C. Morgan
D. Ublansky

Others
A. Ally – National Research Council, Ottawa
J.W. Charters – Steel Company of Canada, Hamilton – Chairman
R. Falconer – United Steelworkers of America, Toronto
J. Nethercott – University of Toronto, Toronto
J. Norman – Campbell Red Lake Mines (Pollutech), Oakville

Meetings Held
November 20, 1985
December 17, 1985
January 7, 1986*

Reports to Council
January 14, 1986

Resulting in
Advisory Memorandum 85-V

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* Meeting with Ministry of Labour officials.

TASK FORCE ON THE IMPLEMENTATION OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

Terms of Reference

i) To review the application and interpretation of the Act and regulations, with particular reference to such issues as:
   - the right to refuse work
   - the role of government
   - legal interpretations
   - responsibilities regarding health and safety information.

ii) To examine the functioning of the joint health and safety committees, including the matter of access to information.

iii) To review the application and implementation of the designated substances regulations.

iv) To make appropriate recommendations.

Members

Council Members
C.J. Tuohy – Chairman
J. Duffy
J. Gill
T.H. Meagher
E.A. Waddell
R.T. Boldt
P.A. Fisher
E. Kaegi
P.L. Rooney

Others
W.A. Barnes – St. Catharines
K. Glassco – Energy & Chemical Workers Union (Polysar Ltd.) J.N. Lockington – Dofasco
C. Schmidt – United Rubber Workers of America (Uniroyal Ltd.) K. Swinton – University of Toronto, Faculty of Law
M.A. Taschereau – Consultant

Technical Advisory Committee
(for survey of joint health and safety committees)

Members
K. Swinton – Chairman
L. Jolley – Consultant
J. Miller – Kidd Creek Mines
K. Glassco
G. Little – Dow Chemical

Meetings Held
June 24, 1985*
June 25, 1985*
October 21, 1985*
January 13, 1986*
January 29, 1986*
March 11, 1986**
March 12, 1986***

Report to Council
October 8, 1985
March 11, 1986

Resulting in
Consultant's report on the survey of joint health and safety committees forwarded to the minister in May 1986.

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* Technical Advisory Committee meeting
** Council meeting with Task Force and Technical Advisory Committee
*** Joint Task Force and Technical Advisory Committee meeting

TASK FORCE ON CRITERIA AND ALTERNATIVE APPROACHES FOR THE CONTROL OF HAZARDOUS SUBSTANCES AND AGENTS IN THE WORKPLACE

Terms of Reference

i) To identify criteria for use in: establishing priorities for the control of hazardous substances and agents in the workplace, selecting appropriate control strategies, and establishing priorities for the development of information on which to assess need for, and evaluation of, control measures.

ii) To consider means for the systematic development of information required to apply criteria as described in i) above.

iii) To review current measures for the control of hazardous substances and agents in the workplace and to consider alternative approaches including possible modifications of the current model of designated substance regulation.

iv) To consider appropriate mechanisms for involvement of affected parties in the types of decisions and processes outlined in terms of reference i), ii) and iii) above.

v) To report and make recommendations to council with respect to these matters.

Members

Council Members
W.K.C. Morgan – Chairman
J.W. Charters
E. Kaegi
C.J. Tuohy
R.T. Boldt
L. Heard
T.H. Meagher

Others
L. Jolley – Consultant
J.M. More – Energy and Chemical Workers Union

Meetings held
September 26, 1985*
October 11, 1985**

Reports of Council
April 9, 1985
May 14, 1985
June 11, 1985
July 30, 1985
September 10, 1985
October 8, 1985
January 14, 1985

Resulting in
Advisory Memorandum 85-I
Advisory Memorandum 85-IV

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* Meeting of council 'Workplace Control Programs' working group (D.R. McCalla, C.J. Tuohy, L. Heard, E.A.R. Kaegi)

** Meeting of council 'Criteria' working group (D.R. McCalla, C.J. Tuohy, L. Heard, S. Warner) with Ministry of Labour officials.

TASK FORCE ON THE ROLE OF HEALTH SURVEILLANCE AND HEALTH SCREENING IN OCCUPATIONAL HEALTH PROGRAMS

Terms of Reference

i) To identify the risks, benefits and costs of health surveillance and health screening in occupational health programs.
ii) To review the laws and procedures governing health surveillance and health screening with regard to the rights and duties of employers, employees, government and the professions.
iii) To make recommendations to the council on policies and principles governing health surveillance and health screening in occupational health programs.

Members

Council Members
J.W. Charters – Chairman (from April 10, 1984)
H.D. Moyer
T. O'Connor
E. Kaegi (from April 10, 1984)

Others
T. Ison – Osgoode Hall Law School
J.M. More – Energy & Chemcial Workers Union
J. Robertson – United Food & Commercial Workers International Union
D. Sackett – McMaster University

Reports to Council
April 9, 1985
May 14, 1985
October 8, 1985

Resulting in
Advisory Memorandum 85-II

TASK FORCE ON CARCINOGENS

Terms of Reference

i) To examine the principles governing the regulation development process to determine how the process can effectively and efficiently identify, prioritize and regulate carcinogens.
ii) To propose recommendations on the policies and principles governing the development of regulations for carcinogens.

Members
D.R. McCalla – Chairman
R.T. Boldt
E.A. Waddell

Meetings Held
July 24, 1985*

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* Meeting with Ministry of Labour officials.

BIOTECHNOLOGY PLANNING GROUP

Terms of Reference

1. To plan council's workshop on biotechnology respecting: participation; agenda and issues to be addressed; and speakers.
2. To make a recommendation to council on the need for the ministry to take specific action and whether or not council should provide advice on the action.

Members

R.T. Boldt
P.A. Fisher
L. Heard*
D.R. McCalla – Chairman
C.J. Tuohy
D. Ublansky**
E.A. Waddell

Meetings Held	*Reports to Council*
June 17, 1985***	July 30, 1985
August 27, 1985	September 10, 1985
March 4, 1986	October 8, 1985
	January 14, 1986
	March 11, 1986

Resulting in

Biotechnology Workshop (October 29, 1985)
Submission to the minister of Biotechnology Workshop Presentation Proceedings (March 24, 1985)

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* to October, 1985
** from March, 1985
*** Conference Call

APPENDICES

APPENDIX A

Non-Fatal and Fatal Injuries Receiving First Payment of Compensation in 1984 by Year-End 1985 in Ontario, Classified by Nature of Injury

Name of Injury	*Non-Fatal Injuries*[1] *1984*		*Fatalities*[2] *1984*	
	No.	*%*	*No.*	*%*
Traumatic Injuries				
Amputation or Enucleation	541	0.31	0	0.00
Asphyxia, Strangulation, Drowning	0	0.00	5	2.84
Burn or Scald – Heat	3,927	2.29	0	0.00
Concussion – Brain, Cerebral	322	0.19	0	0.00
Contusion, Crushing, Bruise – Intact Skin	35,012	20.38	103	58.52
Cut, Laceration, Puncture – Open Wound	21,809	12.69	4	2.27
Dislocation	595	0.35	0	0.00
Electric Shock, Electrocution	166	0.10	5	2.84
Fracture	7,714	4.49	4	2.27
Hernia, Rupture	1,615	0.94	0	0.00
Scratches, Abrasions – Superficial Wounds	5,169	3.01	0	0.00
Sprains, Strains	79,420	46.22	1	0.57
Multiple Injuries	1,134	0.66	6	3.41
Occupational Injury, Unspecified	7,926	4.61	0	0.00
Occupational Injury, NEC[3]	101	0.06	1	0.57
Total Traumatic Injuries	165,451	96.29	129	73.30
Occupational Diseases/Illnesses				
Burn – Chemical	1,100	0.64	0	0.00
Tuberculosis Only	3	0.00	0	0.00
Tuberculosis and Pneumoconiosis	1	0.00	1	0.57
Contagious or Infectious Disease, NEC	331	0.19	0	0.00
Dermatitis	612	0.36	0	0.00
Freezing, Frostbite & Other Envir. Cold	58	0.03	0	0.00
Hearing Loss or Impairment	1,162	0.68	0	0.00
Heat – Sun-Stroke – Envir. Heat	17	0.01	0	0.00
Bursitis	29	0.02	0	0.00
Synovitis, Tenosynovitis	737	0.43	0	0.00
Inflammation or Irritation of Joints, Tendons, etc., NEC	671	0.39	0	0.00
Poisoning, Systemic	678	0.39	4	2.27
Silicosis	11	0.01	0	0.00
Asbestosis	8	0.00	2	1.14
Pneumoconioses, NEC	38	0.02	1	0.57
Radiation Effects	749	0.44	1	0.57
Caisson's Disease	1	0.00	0	0.00
Occupational Illnesses, NEC	124	0.07	38	21.59
Total Diseases/Illnesses	6,330	3.68	47	26.70
Non-Personal Damage	44	0.03	0	0.00
Asbestos Fibres Dust Effect	1	0.00	0	0.00
Total	171,826	100.00	176	100.00

1. Receiving first payment of compensation from Workers' Compensation Board in 1984 and alive by year-end 1985; Schedules I and II firms.
2. Fatalities include those who received first payment of compensation in 1984 and were dead by year-end 1985; Schedules I and II firms. These figures differ from those in the Workers' Compensation Board's record of fatalities. The difference is explained by different definitions of fatality and by different time frames used.
3. Not elsewhere classified.

Source: Strategic Policy Unit, Occupational Health and Safety Division, Ministry of Labour, April 1986.

Note: It is anticipated that, in future, non-fatal and fatal injury data shown in this table will be based on initial settlement rather than on first payment of compensation. Both are shown this year for comparive purposes. See Appendix A-1 for initial settlement data.

APPENDIX A-1

Non-Fatal and Fatal Injuries[1] Initially Settled in Ontario in 1984 and 1985, Classified by Nature of Injury

Name of Injury	Non-Fatal Injuries 1984		Fatalities 1984		Non-Fatal Injuries 1985		Fatalities 1985	
	No.	%	No.	%	No.	%	No.	%
Traumatic Injuries								
Amputation or Enucleation	716	0.44	0	0.00	615	0.34	0	0.00
Asphyxia, Strangulation, Drowning	0	0.00	10	5.00	0	0.00	6	4.17
Burn or Scald – Heat	3,859	2.36	0	0.00	4,297	2.35	3	2.08
Concussion – Brain, Cerebral	377	0.23	0	0.00	370	0.20	0	0.00
Contusion, Crushing, Bruise – Intact Skin	27,078	16.53	103	51.50	37,795	20.65	75	52.08
Cut, Laceration, Puncture – Open Wound	20,460	12.49	1	0.50	23,030	12.58	5	3.47
Dislocation	542	0.33	0	0.00	620	0.34	0	0.00
Electric Shock, Electrocution	181	0.11	4	2.00	175	0.10	6	4.17
Fracture	8,228	5.02	9	4.50	8,498	4.64	3	2.08
Hernia, Rupture	1,637	1.00	0	0.00	1,588	0.87	0	0.00
Scratches, Abrasions – Superficial Wounds	4,997	3.05	0	0.00	5,898	3.22	0	0.00
Sprains, Strains	68,075	41.55	2	1.00	85,932	46.95	4	2.78
Multiple Injuries	1,052	0.64	5	2.50	1,216	0.66	3	2.08
Occupational Injury, NEC[2]	18,664	11.39	14	7.00	6,367	3.48	6	4.17
Total Traumatic Injuries	155,866	95.14	148	74.00	176,401	96.38	111	77.08
Occupational Diseases/Illnesses								
Burn – Chemical	980	0.60	0	0.00	1,188	0.65	0	0.00
Tuberculosis Only	4	0.00	0	0.0	3	0.00	0	0.00
Tuberculosis and Pneumoconiosis	1	0.00	1	0.50	0	0.00	0	0.00
Contagious or Infectious Disease, NEC	384	0.23	0	0.00	414	0.23	0	0.00
Dermatitis	596	0.36	0	0.00	661	0.36	0	0.00
Freezing, Frostbite & Other Envir. Cold	58	0.04	0	0.00	53	0.03	0	0.00
Hearing Loss or Impairment	847	0.52	0	0.00	763	0.42	0	0.00
Heat – Sun-Stroke – Envir. Heat	19	0.01	0	0.00	13	0.01	0	0.00
Bursitis	22	0.01	0	0.00	32	0.02	0	0.00
Synovitis, Tenosynovitis	523	0.32	0	0.00	819	0.45	0	0.00
Inflammation or Irritation of Joints, Tendons, etc. NEC	372	0.23	0	0.00	457	0.25	1	0.69
Poisoning, Systemic	619	0.38	4	2.00	827	0.45	2	1.39
Silicosis	13	0.01	0	0.00	9	0.00	0	0.00
Asbestosis	4	0.00	1	0.50	5	0.00	2	1.39
Pneumoconioses, NEC	46	0.03	0	0.00	36	0.02	1	0.69
Radiation Effects	697	0.43	0	0.00	834	0.46	1	0.69
Caisson's Disease	1	0.00	0	0.00	2	0.00	0	0.00
Occupational Illnesses, NEC	93	0.06	41	20.50	116	0.06	23	15.97
Total Diseases/Illnesses	5,279	3.22	47	23.50	6,232	3.41	30	20.83
Non-Personal Damage	41	0.03	0	0.00	39	0.02	0	0.00
Preventative Measures	0	0.00	0	0.00	1	0.00	0	0.00
Nature of Injury Unknown	2,647	1.62	5	2.50	347	0.19	3	2.08
Total	163,833	100.00	200	100.00	183,020	100.00	144	100.00

1. Claims initially settled in 1984 and 1985 are dated three months following the final activity on a claim to assure that information on the claim is complete; Schedules I and II firms.
2. Not elsewhere classified.

Source: Strategic Policy Unit, Occupational Health and Safety Division, Ministry of Labour, April 1986.

Note: It is anticipated that in future non-fatal and fatal injury data shown here will be based on initial settlement rather than on first payment of compensation. Both are shown this year for comparative purposes. See Appendix A for first payment of compensation data.

APPENDIX B
Number of Fatalities[1] and Fatalities per Million Man-hours[2] for Major Industries in Ontario, 1981-1984.

	1981 Number of Fatalities Attributed to:			*1982* Number of Fatalities Attributed to:			*1983* Number of Fatalities Attributed to:			*1984* Number of Fatalities Attributed to:		
Industry[3]	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*
Agriculture	0	11	0.15	2	7	0.13	1	8	0.13	3	6	0.13
Forestry	0	8	0.40	1	5	0.36	0	9	0.49	0	7	0.35
Mining; Quarrying and Oil Wells	8	11	0.26	20	10	0.40	14	5	0.26	15	15	0.39
Manufacturing	10	39	0.02	19	38	0.03	18	35	0.03	19	29	0.02
Construction	5	31	0.17	7	26	0.13	10	20	0.12	2	27	0.11
Transportation, Communication and Other Utilities	1	26	0.20	2	17	0.13	1	25	0.17	1	16	0.10
Trade	2	9	0.01	1	6	0.01	0	10	0.01	0	10	0.01
Community, Business and Personal Service	0	13	0.01	0	12	0.01	1	9	0.01	1	7	0.02
Public Administration	0	9	0.12	1	0	0.01	1	1	0.02	0	0	0.00
Others (Fishing)	0	0	0.00	0	1	0.93	0	3	2.61	0	1	0.93
All Industries (Schedule I Firms only)	26	157	0.03	53	122	0.04	46	125	0.03	41	118	0.03
All Industries (Schedule II Firms only)	32	174	–	56	145	–	51	146	–	47	129	–

1. Fatalities include those who received first payment of compensation in 1981, 1982, 1983 and 1984 and were dead by year-end 1982, 1983, 1984 and 1985 respectively. These figures differ from those in the Workers' Compensation Board's record of fatalities. The difference is explained by different definitions of fatality and by different time frames used.
2. Man-hour figures were derived from the Workers' Compensation Board 'Final Accident Frequency and Cost Rate by Rate Number Report' for each year.
3. WCB rate groups have been allocated to Statistics Canada's Economic Divisions.

Sources: 1981 figures – Research Branch, Ministry of Labour.
1982 figures – Canadian Centre for Occupational Health and Safety.
1983 and 1984 figures – Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.

APPENDIX C

Number of Injuries[1] per Million Man-hours for Injuries Occurring in Ontario in 1974-1984, Classified by Major Industry.

Industry[2]	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*
Agriculture	31.25	28.41	33.81	32.28	33.52	34.84	36.00	36.08	35.81	40.30	44.66
Forestry and Logging	98.75	79.35	70.30	79.05	85.91	79.46	82.39	83.82	74.00	89.84	89.56
Mining, Quarries and Oil Wells	58.93	63.66	68.32	63.65	53.24	47.12	62.12	56.23	45.84	45.44	43.53
Manufacturing	35.18	32.09	34.00	33.90	34.05	37.25	38.67	36.88	29.92	30.51	35.11
Construction	58.07	51.77	64.02	62.11	62.16	65.67	74.88	68.68	49.04	49.55	51.43
Transportation and Communication	55.56	50.93	55.27	55.71	57.16	64.05	65.27	62.05	53.75	53.00	58.29
Trade, Wholesale and Retail Services	18.73	16.92	18.05	18.09	18.35	18.96	19.15	18.16	16.92	17.29	18.64
Services											
Hospital	11.11	9.67	19.73	19.84	19.88	21.81	23.71	22.76	18.96	19.91	21.17
Teaching	9.41	8.56	9.16	9.23	8.82	9.78	10.43	10.67	7.87	7.20	8.65
Other	10.47	9.36	10.29	10.57	10.61	11.53	12.61	11.91	12.44	13.17	13.98
Public Administration	28.61	27.71	30.43	31.70	31.11	32.32	33.82	31.17	32.78	33.56	32.45
Others (Fishing)	37.53	40.85	33.51	37.49	38.20	24.25	35.70	28.16	31.75	39.20	33.58
All Industries (Schedule I Firms)	28.95	25.73	29.02	28.40	28.07	29.89	31.17	29.37	25.09	25.66	28.32

1. Claims with accident dates for a given year (e.g.: 1984) compensated by the end of the following year (e.g.: 1985). Number of claims and man-hours were derived from the Workers' Compensation Board 'Final Accident Frequency and Cost Rate by Rate Number Report' for each year.

2. WCB rate groups have been allocated to Statistics Canada's Economic Divisions.

Sources: 1974 to 1981 figures – Research Branch, Ministry of Labour.
1982 figures – Canadian Centre for Occupational Health and Safety.
1983 and 1984 figures – Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.

APPENDIX C-1

Number of Injuries[1] Occurring in Ontario in 1974-1984, Classified by Major Industry.

Industry[2]	*1974*	*1975*	*1976*	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*
Agriculture	2,218	2,059	2,145	2,178	2,419	2,481	2,726	2,703	2,474	2,874	3,092
Forestry and Logging	2,256	1,540	1,206	1,449	1,721	1,784	1,786	1,663	1,222	1,655	1,770
Mining, Quarries and Oil Wells	5,084	5,654	6,234	5,480	3,877	3,183	4,451	4,056	3,419	3,315	3,387
Manufacturing	75,043	66,663	70,809	68,676	69,161	79,000	77,272	73,924	62,349	62,016	76,779
Construction	19,026	16,959	18,933	16,791	15,538	15,162	15,161	14,562	12,480	12,465	13,473
Transportation and Communication	7,639	6,880	7,421	7,511	7,703	8,525	8,581	8,403	7,924	7,967	9,520
Trade, Wholesale and Retail Services	12,593	11,752	12,932	12,835	13,243	17,472	14,652	14,452	13,391	13,737	15,776
Services											
Hospital	5,096	5,144	5,150	5,500	5,592	6,278	7,005	7,334	7,377	7,654	8,631
Teaching	624	585	904	1,180	1,121	1,172	1,103	1,156	1,237	1,237	1,513
Other	8,222	8,072	9,190	9,687	10,028	11,414	12,648	12,526	12,295	12,961	14,711
Public Administration	2,232	2,431	2,615	2,892	2,829	2,694	2,504	2,335	2,449	2,714	2,535
Others (Fishing)	34	35	28	31	36	27	37	35	34	45	36
All Industries (Schedule I Firms)	140,067	127,774	137,567	134,210	133,268	146,192	147,926	143,139	126,646	128,646	151,223

1. Claims with accident dates for a given year (e.g.: 1984) compensated by the end of the following year (e.g.: 1985). Number of claims were derived from the Workers' Compensation Board 'Final Accident Frequency and Cost Rate by Rate Number Report' for each year.

2. WCB rate groups have been allocated to Statistics Canada's Economic Divisions.

Sources: 1974 to 1981 figures - Research Branch, Ministry of Labour.
1982 figures - Canadian Centre for Occupational Health and Safety.
1983 and 1984 figures - Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.

APPENDIX D

Number of Injuries[1] and Estimated Injuries per 100 Employees for Major Occupations in Ontario, 1984 and 1985

Occupation[2]	*Non-Fatal and Fatal Injuries 1984*	*Estimated Employment Covered by WCB (000)*[3] *1984*	*Estimated Injuries per 100 Employees Covered by WCB 1984*	*Non-Fatal and Fatal Injuries 1985*	*Estimated Employment Covered by WCB (000)*[3] *1985*	*Estimated Injuries per 100 Employees Covered by WCB 1985*
Managerial	714	459	0.16	761	505	0.15
Natural Sciences	1,032	157	0.66	1,288	170	0.76
Social Sciences	812	63	1.29	887	74	1.19
Religion	3	10	0.03	5	11	0.05
Teaching	1,256	161	0.78	1,358	161	0.84
Medicine and Health	6,589	176	3.72	7,077	190	3.73
Artistic and Recreational	328	72	0.46	381	76	0.50
Clerical	10,387	703	1.49	10,813	721	1.50
Sales	5,212	383	1.36	5,603	378	1.50
Services	19,736	484	4.09	22,002	511	4.31
Agriculture	3,229	83	3.84	3,280	83	3.95
Fishing, Hunting, Trapping	40	1	4.00	49	1	4.90
Forestry and Logging	1,495	12	12.46	1,460	9	16.22
Mining and Quarrying	1,838	16	11.49	1,620	17	9.53
Processing	12,414	133	9.26	13,266	131	10.15
Machining	14,529	105	13.84	16,357	109	15.00
Product Fabricating	26,667	414	6.47	30,720	408	7.54
Construction Trades	15,566	201	7.78	16,976	206	8.23
Transport Equipment Operation	12,907	133	9.70	13,890	147	9.47
Materials Handling	10,272	101	10.17	11,969	107	11.15
Other Crafts and Equipment Operation	1,814	57	3.18	1,920	57	3.35
Not Stated	11,799	–	–	13,666	–	–
Occupations, NEC[4]	13,361	–	–	13,113	–	–
Total	172,002	3,924	4.38	188,461	4,072	4.63

1. Those receiving first payment of compensation from the Workers' Compensation Board (WCB) in 1984 and 1985, Schedules I and II. Non-Fatal and fatal injuries are equivalent to the term, disabling injuries, used in previous years.
2. From the *Canadian Classification and Directory of Occupations.*
3. Figures are derived from Statistics Canada Labour Force Survey, 1984 and 1985. WCB estimates that approximately 92.5% of the total employed labour force is covered, however it should be recognized that whereas coverage in some occupations, such as mining, may be greater than 92.5%, coverage in others, for example agriculture, is considerably less than 92.5%.
4. Not elsewhere classified.

Source: Strategic Policy Unit, Occupational Health and Safety Division, Ministry of Labour, April 1986.

APPENDIX D-1

Selected Occupations Defined by Subgroup from the Canadian Classification and Dictionary of Occupations

1. *Mining* and quarrying including oil and gas field operations have the following occupational groups included: foremen, rotary well-drilling, other rock and soil drilling, blasting, cutting, handling and loading, labouring and other elemental work, and not elswhere classified (NEC).

2. *Machining* and related occupations have these groups included: foremen *metal machining*: tool and die making, machinist and machine tool setup, machine tool operating; *metal shaping and forming*: forging, sheet metal workers; welding and flame cutting, boilermakers, platers and structural metal workers; foremen *wood machining*: wood pattern making, wood sawing and related work, wood sanding; foremen *clay, glass and stone and related materials*: cutting and shaping, abrading and polishing; foremen *other machining* and related work, engravers and etchers, filing, grinding, buffing, cleaning and polishing work, inspecting, testing, grading and sampling occupations.

3. *Forestry* includes these groups of occupations: foremen forestry and logging, forestry conservation, timber cutting, log hoisting, sorting, moving, labouring, forestry and logging NEC, log inspecting, grading and scaling.

4. *Materials handling* has these occupations grouped together: foremen materials handling NEC, hoisting operations NEC, longshoremen, stevedores and freight handlers, materials handling equipment operators NEC, packaging, labouring in materials handling work.

5. *Processing* occupations are composed of: *mineral ore*: treating, crushing and grinding, mixing, filtering, melting and roasting; *metal processing*: smelting, converting and refining, metal heat treating, metal rolling, moulding, coremaking and metal casting, metal extruding and drawing, plating and metal spraying: *clay, glass and stone* furnacemen and kilnmen, separating, grinding, crushing and mixing, forming; *chemicals, petroleum, rubber, plastic and related materials:* mixing and blending, filtering, straining and separating, distilling, subliming and carbonizing, coating and calendarizing; *food, beverage and related*: flour and grain milling, baking, confectionery making, slaughtering and meat cutting, canning, curing and packing, fish canning, curing and packing, fruit and vegetable canning, preserving and packing, milk processing, sugar processing, beverage processing; *Wood*: sawmill sawyers, plywood making, wood treating; *Pulp and paper making*: cellulose preparing, papermaking and finishing; *Textiles*: fibre preparing, spinning, winding, weaving, knitting, bleaching, finishing; *Other*: tobacco, hide and pelt. Foremen, inspecting, testing and grading, elemental labour in all above groups.

6. *Transportation and Equipment* operating occupations have the following sub-groups: air transport, railway transport, water transport, motor transport and the specific occupations in each.

7. *Construction* has these sub-groups: excavating, grading and paving, electrical power, lighting and wire communications equipment erecting, installing and repairing and construction trades—carpenters, brick and stone masons, concrete finishing, plasterers, painters and paper hangers, insulating, roofing, pipe-fitting, structural metal erectors, glazers. Foremen inspecting, testing, grading and sampling, and elemental labour are included in the above where appropriate.

8. *Product fabricating* classification is composed of: metal products; electrical, electronic and related equipment; wood products; textile, fur and leather products; rubber, plastic and related products; mechanics and repairmen except electrical; and other: jewellery and silverware, marine craft, paper products, and painting and decorating.

APPENDIX E

Temporary Total Days Lost Up to Initial Settlement for Industries in Ontario 1981-1985[1]

	1981	*1982*	*1983*	*1984*	*1985*
	(000)	*(000)*	*(000)*	*(000)*	*(000)*
Agriculture	77.4	86.1	93.9	110.4	103.2
Forestry	44.6	49.8	69.8	85.1	83.9
Fishing/Trapping	0.5	0.4	1.6	1.0	1.5
Mines, Quarries and Oil Wells	108.9	134.4	180.9	179.6	160.6
Manufacturing	1582.9	1714.8	1896.7	2331.9	2427.0
Construction	615.0	636.7	810.5	934.9	900.0
Transportation, Communications and Other Utilities	340.3	409.3	468.1	587.3	578.7
Trade	486.9	526.5	582.8	735.5	771.5
Services*	538.4	620.6	699.3	881.6	938.9
Public administration	293.7	276.9	295.0	348.0	389.0
Unknown	1.0	–	1.0	0.0	–
Total**	4089.5	4455.4	5099.6	6195.3	6354.2

*Services includes SIC categories Finance, Insurance, Real Estate and Community, Business and Personal Services.

**Total may not add due to rounding of the data.

1. Shows days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated, by industry (SIC Major Division). Days lost due to death, permanent disability and for medical aid only and light duty (temporary partial disability) are not included.

Source: 1981-83: Canadian Centre for Occupational Health and Safety – March 1985 from WBC's Statistics System.
1984-85: Workers' Compensation Board of Ontario

Note: Industry categories in Table E are based on Standard Industrial Classification groupings and differ from industry categories shown in Tables B, C, and C-1 which are based on WCB rate groups.

APPENDIX F

Temporary Total Days Lost Up to Initial Settlement by Occupation in Ontario 1981-1985[1]

	1981	*1982*	*1983*	*1984*	*1985*
	(000)	*(000)*	*(000)*	*(000)*	*(000)*
Managerial, Professional	22.8	21.6	23.3	25.1	23.7
Natural Science	18.4	22.6	30.8	32.3	30.8
Social Science	13.0	12.4	12.6	19.2	20.4
Religion	0.4	0.2	0.9	0.1	0.8
Teaching	12.9	11.3	16.0	17.7	18.5
Medicine and Health	117.6	149.9	163.4	212.7	230.6
Artistic and Recreational	7.0	9.8	8.4	10.3	9.9
Clerical	162.8	171.3	199.9	245.1	264.5
Sales	103.6	101.5	122.0	140.8	159.4
Service	381.4	431.0	487.4	603.7	637.9
Agriculture	85.3	97.3	101.2	129.3	121.7
Fishing, Hunting, Trapping	0.6	1.0	0.9	1.0	2.1
Forestry and Logging	59.1	61.4	78.0	89.7	89.2
Mining and Quarrying	70.2	80.2	114.6	104.5	93.0
Processing	289.3	319.0	350.3	428.2	425.4
Machining	363.4	382.6	401.8	483.4	495.8
Product Fabricating	599.2	649.3	713.7	871.3	942.8
Construction Trades	600.0	629.8	798.4	901.5	878.7
Transport Equipment Operation	342.4	376.0	432.6	523.8	537.6
Material Handling	233.9	239.7	265.4	353.7	332.1
Other Craft and Equipment Operation	36.4	42.4	41.5	50.1	50.4
Not Stated	244.0	295.3	364.1	485.7	513.7
Occupation, NEC	325.3	349.8	372.3	466.0	475.2
Totals**	4089.5	4455.4	5099.6	6195.3	6354.2

*Days lost less than one hundred.

**Totals may not add up due to rounding of the data.

1. Shows days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated, by occupation (OCM 2-digit). Days lost due to death, permanent disability and for medical aid only and light duty (temporary partial disability) are not included.

Source: 1981-83: Canadian Centre for Occupational Health and Safety – March 1985 from WBC's Statistics System.
1984-85: Workers' Compensation Board of Ontario

APPENDIX G
Temporary Total Days Lost Up to Initial Settlement by Nature of Injury in Ontario 1981-1985[1]

	1981	*1982*	*1983*	*1984*	*1985*
	(000)	*(000)*	*(000)*	*(000)*	*(000)*
Traumatic Injuries					
Amputation, enucleation	61.1	64.8	54.7	67.2	46.0
Asphyxia, strangulation, drowning	*	*	*	*	*
Burn, scald	49.0	51.1	46.9	58.4	59.9
Concussion	17.5	16.7	22.3	19.9	20.6
Contusion, bruise	358.8	374.2	423.6	566.4	775.8
Cut, laceration	287.6	300.0	293.6	356.4	382.5
Dislocation	29.9	32.3	34.0	33.2	32.5
Electric shock	6.9	6.4	6.7	7.5	8.2
Fracture	467.7	500.0	524.7	560.7	518.6
Hernia, rupture	68.0	70.0	65.9	69.8	70.9
Scratches, abrasion	28.6	24.9	25.8	32.7	33.5
Sprain, strain	1554.1	1720.8	1937.6	2659.0	2941.1
Multiple injuries	96.9	99.1	124.9	121.6	121.9
Occupational injuries, unspecified	903.4	1000.0	1332.9	1377.7	1116.6
Occupational injuries, NEC	0.7	2.1	4.5	4.5	3.8
Total Traumatic Injuries	3930.2	4262.4	4898.1	5935.0	6131.9
Occupational Diseases/Illnesses					
Burn, chemical	10.0	8.6	13.0	10.1	10.4
Tuberculosis	0.7	0.1	*	0.3	0.4
Tuberculosis and pneumoconiosis	*	*	0	0.1	0
Contagious, infectious disease, NEC	2.3	4.4	6.9	6.2	4.9
Dermatitis	10.8	13.4	17.1	19.6	17.9
Freezing, frostbite	1.3	1.1	1.2	3.0	1.3
Hearing loss or impairment	0.1	*	*	0.6	*
Heat, sunstroke	0.1	0.2	0.1	0.2	*
Bursitis	0.6	0.6	1.4	1.6	1.7
Synovitis, tenosynovitis	16.0	22.2	23.3	31.1	39.8
Inflammation, irritation of joints, tendons, etc., NEC	9.0	9.4	13.9	23.2	25.2
Poisoning, systemic	6.7	9.0	6.9	5.8	9.6
Silicosis	0.8	*	0.1	0.6	*
Asbestosis	0.2	1.1	*	1.4	0.2
Pneumoconioses, NEC	1.5	2.1	1.7	2.8	2.6
Radiation effects	2.7	4.5	3.4	2.4	2.7
Caisson's disease	*	*	0.4	*	*
Occupational illnesses, NEC	11.8	11.1	11.9	16.9	15.0
Total Diseases/Illnesses	74.6	87.8	101.3	125.9	131.7
Non-personal damage	0.5	0.1	0.4	0.5	0.4
Preventative measures	*	*	*	*	*
Unknown	84.1	104.9	99.7	133.7	90.1
Total**	4089.5	4455.4	5099.6	6195.3	6354.2

*Days lost less than one hundred. Only days of temporary total are shown. There is no imputation for fatalities.

**Totals may not add due to rounding of the data.

1. Short days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated, by nature of injury. Days lost due to death, permanent disability and for medical aid only and light duty (temporary partial disability) are not included.

Source: 1981-83: Canadian Centre for Occupational Health and Safety – March 1985 from WCB's Statistics System
1984-85: Workers' Compensation Board of Ontario.

APPENDIX H

Count of Fatal and Non-Fatal and Days of Temporary Total Disability by SIC[1] for Disabling Injury Claims Initially Settled in 1985 – WCB Schedule I Employers

INDUSTRY	*Number of Claims*			*Days of Temporary Total Disability*
	Fatal	*Non-Fatal*	*Total*	
011 Livestock and Livestock Combination Farms	0	450	450	16,728
013 Field Crop and Field Crop Combination Farms	0	507	507	27,962
015 Fruit and Vegetable Farms	2	215	217	8,344
017 Other Crop and Livestock Combination Farms	1	560	561	29,021
019 Miscellaneous Specialty Farms	1	513	514	16,667
02 Farms (except Experimental and Institutional Farms)	*4*	*2,245*	*2,249*	*98,722*
021 Services Incidental to Agriculture	1	224	225	4,487
03 Services Incidental to Agriculture	*1*	*224*	*225*	*4,487*
01 Agriculture	**5**	**2,469**	**2,474**	**103,208**
031 Logging	2	1,336	1,338	83,446
01 Logging	*2*	*1,336*	*1,338*	*83,446*
039 Forestry Services	0	27	27	465
02 Forestry Services	*0*	*27*	*27*	*465*
02 Forestry	**2**	**1,363**	**1,365**	**83,912**
041 Fishing	0	36	36	1,205
01 Fishing	*0*	*36*	*36*	*1,205*
045 Fishery Services	0	3	3	10
02 Fishery Services	*0*	*3*	*3*	*10*
047 Hunting and Trapping	0	4	4	309
03 Hunting and Trapping	*0*	*4*	*4*	*309*
03 Fishing and Trapping	**0**	**43**	**43**	**1,524**
051 Placer Gold Mines	0	13	13	2,240
052 Gold Quartz Mines	1	261	262	14,929
057 Uranium Mines	7	389	396	24,647
058 Iron Mines	0	28	28	1,095
059 Miscellaneous Metal Mines	5	1,025	1,030	79,902
01 Metal Mines	*13*	*1,716*	*1,729*	*122,813*
064 Crude Petroleum and Natural Gas Industry	0	13	13	154
02 Mineral Fuels	*0*	*13*	*13*	*154*
071 Asbestos Mines	0	2	2	10
072 Peat Extraction	0	5	5	39
073 Gypsum Mines	0	2	2	25
079 Miscellaneous Non Metal Mines	2	112	114	3,064
03 Non-Metal Mines (Except Coal Mines)	*2*	*121*	*123*	*3,138*
083 Stone Quarries	0	80	80	4,633
087 Sand Pits or Quarries	0	200	200	10,722
04 Quarries and Sand Pits	*0*	*280*	*280*	*15,355*
096 Contract Drilling for Petroleum	1	19	20	1,137
098 Other Contract Drilling	1	131	132	7,832
099 Miscellaneous Services Incidental to Mining	1	189	190	10,199
05 Services Incidental to Mining	*3*	*339*	*342*	*19,168*
04 Mines (Including Milling), Quarries and Oil Wells	**18**	**2,469**	**2,487**	**160,628**

(continued)

APPENDIX H *(continued)*

	Number of Claims			*Days of Temporary Total Disability*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*	
101 Meat and Poultry Products Industries	0	2,517	2,517	100,067
102 Fish Products Industry	2	96	98	1,966
103 Fruit and Vegetable Processing Industries	1	932	933	32,792
104 Dairy Products Industry	0	861	861	30,681
105 Flour and Breakfast Cereal Products Industry	0	166	166	6,823
106 Feed Industry	0	340	340	8,498
107 Bakery Products Industries	0	1,089	1,089	47,599
108 Miscellaneous Food Industries	0	1,221	1,221	45,032
109 Beverage Industries	0	1,174	1,174	31,445
01 Food and Beverage Industries	*3*	*8,396*	*8,399*	*304,903*
151 Leaf Tobacco Processors	0	27	27	302
153 Tobacco Products Manufacturers	0	99	99	3,228
02 Tobacco Products Industries	*0*	*126*	*126*	*3,529*
162 Rubber Products Industries	0	1,472	1,472	44,919
165 Plastics Fabricating Industry NES	1	3,001	3,002	94,093
03 Rubber and Plastics Products Industries	*1*	*4,473*	*4,474*	*139,011*
172 Leather Tanneries	0	156	156	5,831
174 Shoe Factories	1	322	323	13,946
175 Leather Glove Factories	0	18	18	1,162
179 Luggage Handbag and Small Leather Goods Manufacturers	0	276	276	5,987
04 Leather Industries	*1*	*772*	*773*	*26,926*
181 Cotton Yarn and Cloth Mills	0	156	156	5,597
182 Wool Yarn and Cloth Mills	0	136	136	4,795
183 Manmade Fibre Yarn and Cloth Mills	0	289	289	7,340
184 Cordage and Twine Industry	0	8	8	103
185 Felt and Fibre Processing Mills	0	83	83	4,429
186 Carpet Mat and Rug Industry	0	257	257	8,607
187 Canvas Products and Cotton and Jute Bags Industry	0	90	90	8,003
188 Automobile Fabric Accessories Industry	0	167	167	8,641
189 Miscellaneous Textile Industries	0	601	601	20,793
05 Textile Industries	*0*	*1,787*	*1,787*	*68,307*
231 Hosiery Mills	0	134	134	5,568
239 Knitting Mills Except Hosiery Mills	0	203	203	10,508
06 Knitting Mills	*0*	*337*	*337*	*16,076*
243 Men's Clothing Industries	0	440	440	20,454
244 Women's Clothing Industries	0	229	229	11,975
245 Children's Clothing Industry	0	56	56	3,343
246 Fur Goods Industry	0	8	8	1,477
248 Foundation Garment Industry	0	19	19	387
249 Miscellaneous Clothing Industries	0	236	236	10,662
07 Clothing Industries	*0*	*988*	*988*	*48,296*
251 Sawmills Planing Mills and Shingle Mills	3	791	794	27,670
252 Veneer and Plywood Mills	1	114	115	4,096
254 Sash Door and Other Millwork Plants	1	1,053	1,054	32,073
256 Wooden Box Factories	0	262	262	7,626
258 Coffin and Casket Industry	0	24	24	215
259 Miscellaneous Wood Industries	0	424	424	14,728
08 Wood Industries	*5*	*2,668*	*2,673*	*86,408*
261 Household Furniture Manufacturers	0	1,423	1,423	55,849
264 Office Furniture Manufacturers	0	355	355	10,396
266 Miscellaneous Furniture and Fixtures Manufacturers	1	688	689	25,912
268 Electric Lamp and Shade Manufacturers	0	46	46	1,169
09 Furniture and Fixture Industries	*1*	*2,512*	*2,513*	*93,327*

(continued)

APPENDIX H *(continued)*

	Number of Claims			*Days of Temporary Total Disability*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*	
271 Pulp and Paper Mills	2	786	788	41,248
272 Asphalt Roofing Manufacturers	0	30	30	962
273 Paper Box and Bag Manufacturers	0	884	884	31,588
274 Miscellaneous Paper Converters	1	799	800	27,731
10 Paper and Allied Industries	*3*	*2,499*	*2,502*	*101,528*
286 Commercial Printing	1	1,323	1,324	32,214
287 Platemaking Typesetting and Trade Industries	0	154	154	4,555
288 Publishing Only	0	160	160	4,286
289 Publishing and Printing	1	289	290	5,768
11 Printing Publishing and Allied Industries	*2*	*1,926*	*1,928*	*46,824*
291 Iron and Steel Mills	7	2,663	2,670	126,199
292 Steel Pipe and Tube Mills	0	358	358	12,265
294 Iron Foundries	0	868	868	23,348
295 Smelting and Refining	0	269	269	16,505
296 Aluminum Rolling Casting and Extruding	0	428	428	11,407
297 Copper and Copper Alloy Rolling Casting and Extruding	1	250	251	9,541
298 Metal Rolling Casting and Extruding NES	1	506	507	14,510
12 Primary Metal Industries	*9*	*5,342*	*5,351*	*213,773*
301 Boiler and Plate Works	2	287	289	11,389
302 Fabricated Structural Metal Industry	0	759	759	33,430
303 Ornamental and Architectural Metal Industry	0	890	890	34,361
304 Metal Stamping Pressing and Coating Industry	1	2,539	2,540	78,055
305 Wire and Wire Products Manufacturers	1	868	869	28,843
306 Hardware Tool and Cutlery Manufacturers	0	1,324	1,324	36,177
307 Heating Equipment Manufacturers	0	406	406	10,609
308 Machine Shops	0	1,203	1,203	34,828
309 Miscellaneous Metal Fabricating Industries	0	2,252	2,252	62,725
13 Metal Fabricating Ind. (Except Machinery and Transportation Eqpt.)	*4*	*10,528*	*10,532*	*330,417*
311 Agricultural Implement Industry	0	503	503	21,043
315 Miscellaneous Machinery and Equipment Manufacturing	1	3,011	3,012	89,509
316 Commercial Refrigeration & Air Conditioning Equipment	0	181	181	5,767
318 Office and Store Machinery Manufacturers	0	193	193	3,408
14 Machinery Industries (Except Electrical Machinery)	*1*	*3,888*	*3,889*	*119,728*
321 Aircraft and Aircraft Parts Manufacturers	0	882	882	25,999
323 Motor Vehicle Manufacturers	0	7,532	7,532	271,908
324 Truck Body and Trailer Manufacturers	0	834	834	24,713
325 Motor Vehicle Parts and Accessories Manufacturers	1	5,505	5,506	150,982
326 Railroad Roliing Stock Industry	0	343	343	10,635
327 Shipbuilding and Repair	0	100	100	5,059
328 Boatbuilding and Repair	0	204	204	4,439
329 Miscellaneous Vehicle Manufacturers	0	69	69	688
15 Transportation Equipment Industries	*1*	*15,469*	*15,470*	*494,422*
331 Manufacturers of Small Electric Appliances	0	272	272	16,242
332 Manufacturers of Major Appliances Electric & Equipment	1	518	519	23,540

(continued)

APPENDIX H *(continued)*

	Number of Claims			*Days of Temporary Total Disability*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*	
333 Manufacturers of Lighting Fixtures	0	129	129	4,849
334 Manufacturers of Household Radio and Television	0	224	224	6,277
335 Communications Equipment Manufacturers	0	866	866	22,150
336 Manufacturers of Electrical Industrial Equipment	0	868	868	39,268
338 Manufacturers of Electric Wire and Cable	0	152	152	4,642
339 Manufacturers of Miscellaneous Electrical Products	0	524	524	15,800
16 Electrical Products Industries	*1*	*3,553*	*3,554*	*132,767*
351 Clay Products Manufacturers	0	127	127	4,254
352 Cement Manufacturers	0	71	71	2,428
353 Stone Products Manufacturers	0	24	24	1,024
354 Concrete Products Manufacturers	1	481	482	16,326
355 Ready Mix Concrete Manufacturers	0	258	258	13,785
356 Glass and Glass Products Manufacturers	0	812	812	25,331
357 Abrasives Manufacturers	0	179	179	6,496
358 Lime Manufacturers	0	8	8	171
359 Miscellaneous Non Metallic Mineral Products Industries	0	557	557	16,723
17 Non-Metallic Mineral Products Industries	*1*	*2,517*	*2,518*	*86,539*
365 Petroleum Refineries	0	123	123	3,496
369 Miscellaneous Petroleum and Coal Products Industries	0	21	21	1,932
18 Petroleum and Coal Products Industries	*0*	*144*	*144*	*5,428*
372 Manufacturers of Mixed Fertilizers	0	48	48	801
373 Manufacturers of Plastics and Synthetic Resins	0	123	123	5,116
374 Manufacturers of Pharmaceuticals and Medicines	0	289	289	9,552
375 Paint and Varnish Manufacturers	0	212	212	5,688
376 Manufacturers of Soap and Cleaning Compounds	0	129	129	3,782
377 Manufacturers of Toilet Preparations	0	167	167	3,180
378 Manufacturers of Industrial Chemicals	0	333	333	13,780
379 Miscellaneous Chemical Industries	0	438	438	11,205
19 Chemical and Chemical Products Industries	*0*	*1,739*	*1,739*	*53,104*
391 Scientific and Professional Equipment Industries	0	467	467	14,220
392 Jewellery and Silverware Industry	0	158	158	3,938
393 Sporting Goods and Toy Industries	0	261	261	10,964
397 Signs and Displays Industry	0	247	247	9,607
399 Miscellaneous Manufacturing Industries NES	1	513	514	15,623
20 Miscellaneous Manufacturing Industries	*1*	*1,646*	*1,647*	*54,353*
05 Manufacturing Industries	**34**	**71,310**	**71,344**	**2,425,666**
404 Building Construction	7	3,575	3,582	229,442
406 Highway Bridge and Street Construction	3	725	728	73,477
409 Other Construction	7	775	782	60,377
01 General Contractors	*17*	*5,075*	*5,092*	*363,296*
421 Special Trade Contractors	17	9,645	9,662	536,654
02 Special-Trade Contractors	*17*	*9,645*	*9,662*	*536,654*
06 Construction Industry	**34**	**14,720**	**14,754**	**899,950**

(continued)

APPENDIX H *(continued)*

INDUSTRY	*Number of Claims* *Fatal*	 *Non-Fatal*	 *Total*	*Days of Temporary Total Disability*
501 Air Transport	0	245	245	4,513
502 Services Incidental to Air Transport	0	70	70	3,035
503 Railway Transport	0	26	26	657
504 Water Transport	0	105	105	2,551
505 Services Incidental to Water Transport	0	83	83	7,360
506 Moving and Storage Used Goods Uncrated	0	503	503	12,525
507 Other Truck Transport	9	5,452	5,461	228,478
508 Bus Transport Interurban and Rural	0	188	188	6,122
509 Urban Transit Systems	0	115	115	3,875
512 Taxicab Operations	0	80	80	5,138
515 Pipeline Transport	1	18	19	661
516 Highway and Bridge Maintenance	1	49	50	1,298
517 Miscellaneous Services Incidental to Transportation	0	196	196	5,628
519 Other Transportation	0	381	381	13,268
01 Transportation	*11*	*7,511*	*7,522*	*295,107*
524 Grain Elevators	0	124	124	4,130
527 Other Storage and Warehousing	0	438	438	12,978
02 Storage	*0*	*562*	*562*	*17,108*
543 Radio and Television Broadcasting	0	151	151	2,628
544 Telephone Systems	0	27	27	569
545 Telegraph and Cable Systems	0	10	10	70
548 Post Office	0	15	15	90
03 Communications	*0*	*203*	*203*	*3,357*
572 Electric Power	0	316	316	8,094
574 Gas Distribution	1	238	239	3,573
576 Water Systems	0	80	80	1,312
579 Other Utilities	0	310	310	10,280
04 Electric Power, Gas and Water Utilities	*1*	*944*	*945*	*23,223*
07 Transportation, Communication and Other Utilities	**12**	**9,220**	**9,232**	**338,795**
602 Wholesalers of Farm Products	0	107	107	3,691
606 Wholesalers of Coal and Coke	0	25	25	1,126
608 Wholesalers of Petroleum Products	1	269	270	10,401
611 Wholesalers of Paper and Paper Products	0	224	224	4,516
612 Wholesalers of General Merchandise	0	10	10	86
614 Wholesalers of Food	0	1,477	1,477	46,089
615 Wholesalers of Tobacco Products	0	62	62	1,030
616 Wholesalers of Drugs and Toilet Preparations	0	178	178	5,273
617 Wholesalers of Apparel and Dry Goods	0	225	225	6,888
618 Wholesalers of Household Furniture and Furnishings	0	79	79	3,875
619 Wholesalers of Motor Vehicles and Accessories	1	1,313	1,314	37,279
621 Wholesalers of Electrical Machinery and Equipment	0	292	292	8,234
622 Wholesalers of Farm Machinery and Equipment	1	215	216	10,376
623 Wholesalers of Machinery and Equipment NES	0	1,252	1,252	38,861
624 Wholesalers of Hardware Plumbing and Heating	0	474	474	10,552
625 Wholesalers of Metal and Metal Products NES	0	292	292	10,598
626 Wholesalers of Lumber and Building Materials	2	1,311	1,313	44,238

(continued)

APPENDIX H *(continued)*

INDUSTRY	*Number of Claims* *Fatal*	*Non-Fatal*	*Total*	*Days of Temporary Total Disability*
627 Wholesalers of Scrap and Waste Materials	0	603	603	21,997
629 Wholesalers NES	0	1,201	1,201	37,413
01 Wholesale Trade	*5*	*9,609*	*9,614*	*302,523*
631 Food Stores	1	4,705	4,706	127,955
642 General Merchandise Stores	0	3,374	3,374	79,346
652 Tire Battery and Accessories Stores	2	705	707	21,959
654 Gasoline Service Stations	3	1,548	1,551	51,866
656 Motor Vehicle Dealers	0	1,159	1,159	25,770
658 Motor Vehicle Repair Shops	0	2,065	2,065	52,775
663 Shoe Stores	0	151	151	4,772
665 Men's Clothing Stores	0	158	158	3,511
667 Women's Clothing Stores	0	105	105	3,360
669 Clothing and Dry Goods Stores NES	0	128	128	4,922
673 Hardware Stores	0	174	174	5,993
676 Household Furniture and Appliance Stores	0	716	716	23,414
678 Radio Television and Electrical Appliance Repair Shops	0	97	97	4,918
681 Drug Stores	0	253	253	5,123
691 Book and Stationery Stores	0	68	68	3,090
692 Florists Shops	0	97	97	3,575
694 Jewellery Stores	0	18	18	450
695 Watch and Jewellery Repair Shops	0	2	2	14
696 Liquor Wine and Beer Stores	0	303	303	8,846
697 Tobacconists	0	20	20	333
699 Retail Stores NES	0	1,002	1,002	30,246
02 Retail Trade	*6*	*16,848*	*16,854*	*462,237*
08 Trade	**11**	**26,457**	**26,468**	**764,759**
701 Banks and Other Deposit Accepting Establishments	0	205	205	9,205
703 Other Credit Agencies	0	7	7	94
705 Security Brokers and Dealers Including Exchange	0	1	1	4
707 Investment and Holdings Companies	1	329	330	7,779
01 Finance Industries	*1*	*542*	*543*	*17,082*
721 Insurance Carriers	0	30	30	649
02 Insurance Carriers	*0*	*30*	*30*	*649*
735 Insurance and Real Estate Agencies	0	55	55	2,446
737 Real Estate Operators	2	886	888	44,896
03 Insurance Agencies and Real Estate Industries	*2*	*941*	*943*	*47,342*
09 Finance, Insurance and Real Estate	**3**	**1,513**	**1,516**	**65,073**
801 Kindergartens and Nursery Schools	0	109	109	1,551
802 Elementary and Secondary Schools	0	1,610	1,610	34,804
803 Schools of Art and of the Performing Arts	0	1	1	178
804 Vocational Centres Trade Schools and Business	0	55	55	1,786
805 Post Secondary Non University Educational Institutions	0	291	291	6,254
806 Universities and Colleges	0	615	615	12,342
807 Libraries Museums and Other Repositories	0	80	80	1,448
809 Education and Related Services NES	0	19	19	173
01 Education and Related Services	*0*	*2,780*	*2,780*	*58,535*

(continued)

APPENDIX H *(continued)*

	Number of Claims			*Days of Temporary Total Disability*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*	
821 Hospitals	1	5,116	5,117	154,898
822 Related Health Care Institutions	0	1,295	1,295	46,015
823 Offices of Physicians and Surgeons	0	63	63	3,166
824 Offices of Paramedical Personnel Practitioners	0	50	50	1,229
825 Offices of Dentists	0	4	4	139
826 Diagnostic and Therapeutic Services NES	0	146	146	5,856
827 Miscellaneous Health Services	0	110	110	3,052
828 Welfare Organizations	0	1,995	1,995	67,049
02 Health and Welfare Services	*1*	*8,779*	*8,780*	*281,403*
831 Religious Organizations	0	58	58	1,754
03 Religious Organizations	*0*	*58*	*58*	*1,754*
841 Motion Picture Theatres	1	35	36	650
842 Motion Picture Production and Distribution	0	29	29	659
843 Bowling Alleys and Billiard Parlours	0	38	38	671
844 Golf Clubs and Country Clubs	0	171	171	4,673
845 Theatrical and Other Staged Entertainment Services	0	19	19	602
849 Miscellaneous Amusement and Recreation Services	0	371	371	8,871
04 Amusement and Recreation Services	*1*	*663*	*664*	*16,126*
851 Employment Agencies and Personnel Suppliers	0	751	751	20,253
853 Computer Services	0	29	29	544
855 Security and Investigation Services	1	868	869	26,847
861 Offices of Accountants	0	38	38	1,373
862 Advertising Services	0	81	81	1,522
863 Offices of Architects	0	10	10	66
864 Engineering and Scientific Services	1	360	361	10,239
866 Offices of Lawyers and Notaries	0	4	4	12
867 Offices of Management and Business Consultants	0	110	110	1,442
869 Miscellaneous Services to Business Management	1	756	757	23,981
05 Services to Business Management	*3*	*3,007*	*3,010*	*86,279*
871 Shoe Repair Shops	0	49	49	3,404
872 Barber and Beauty Shops	0	18	18	1,087
873 Private Households	0	55	55	1,541
874 Laundries Cleaners and Pressers Except Self Serve	0	482	482	21,388
876 Self Service Laundries and Dry Cleaners	0	13	13	473
877 Funeral Services	0	85	85	2,496
879 Miscellaneous Personal Services	0	102	102	3,595
06 Personal Services	*0*	*804*	*804*	*33,984*
881 Hotels and Motels	1	1,810	1,811	58,983
883 Lodging Houses and Residential Clubs	0	13	13	388
884 Camping Grounds and Trailer Parks	0	42	42	2,812
886 Restaurants Caterers and Taverns	0	6,640	6,640	167,604
07 Accommodation and Food Services	*1*	*8,505*	*8,506*	*229,787*
891 Labour Organizations and Trade Associations	0	187	187	5,531
893 Photographic Services NES	0	44	44	1,374
894 Automobile and Truck Rental	1	126	127	3,242
895 Machinery and Equipment Rental	0	268	268	6,562
896 Blacksmithing and Welding Shops	0	262	262	8,294
897 Miscellaneous Repair Shops	1	202	203	4,939

(continued)

APPENDIX H *(continued)*

INDUSTRY	*Number of Claims* *Fatal*	 *Non-Fatal*	 *Total*	*Days of Temporary Total Disability*
898 Services to Buildings and Dwellings	0	1,268	1,268	57,401
899 Miscellaneous Services NES	0	421	421	14,976
08 Miscellaneous Services	*2*	*2,778*	*2,780*	*102,317*
10 Community, Business and Personal Service Industries	**8**	**27,374**	**27,382**	**810,187**
902 Defence Services	0	20	20	171
909 Other Federal Administration	0	18	18	1,212
01 Federal Administration	*0*	*38*	*38*	*1,383*
931 Provincial Administration	0	46	46	1,950
02 Provincial Administration	*0*	*46*	*46*	*1,950*
951 Local Administration	4	2,726	2,730	84,982
03 Local Administration	*4*	*2,726*	*2,730*	*84,982*
11 Public Administration and Defence	**4**	**2,810**	**2,814**	**88,314**
***Total for Schedule 1**	**131**	**159,748**	**159,879**	**5,742,016**

1 Industry Classification: Standard Industrial Classification 1970.

2 Days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated.

Source: Canadian Centre for Occupational Health and Safety – from WCB's Initial Settlement System.

APPENDIX I

Count of Fatal and Non-Fatal and Days of Temporary Total Disability by SIC[1] for Disabling Injury Claims Initially Settled in 1985 – WCB Schedule II Employers

INDUSTRY	*Number of Claims*			*Days of Temporary Total Disability*
	Fatal	*Non-Fatal*	*Total*	
295 Smelting and Refining	0	31	31	801
12 Primary Metal Industries	*0*	*31*	*31*	*801*
304 Metal Stamping Pressing and Coating Industry	0	12	12	518
13 Metal Fabricating Ind. (Except Machinery and Transportation)	*0*	*12*	*12*	*518*
05 Manufacturing Industries	**0**	**43**	**43**	**1,319**
421 Special Trade Contractors	0	2	2	13
02 Special-Trade Contractors	*0*	*2*	*2*	*13*
06 Construction Industry	**0**	**2**	**2**	**13**
501 Air Transport	0	549	549	11,435
503 Railway Transport	3	1,634	1,637	68,602
504 Water Transport	0	275	275	18,789
505 Services Incidental to Water Transport	0	260	260	16,585
507 Other Truck Transport	0	6	6	788
509 Urban Transit Systems	1	678	679	17,991
516 Highway and Bridge Maintenance	0	3	3	23
517 Miscellaneous Services Incidental to Transportation	0	11	11	214
519 Other Transportation	0	95	95	1,532
01 Transportation	*4*	*3,511*	*3,515*	*135,959*
543 Radio and Television Broadcasting	0	39	39	803
544 Telephone Systems	0	372	372	4,247
545 Telegraph and Cable Systems	0	32	32	795
548 Post Office	0	3,278	3,278	58,707
03 Communications	*0*	*3,721*	*3,721*	*64,552*
572 Electric Power	0	1,073	1,073	39,273
576 Water Systems	0	7	7	99
04 Electric Power, Gas and Water Utilities	*0*	*1,080*	*1,080*	*39,372*
07 Transportation, Communication and Other Utilities	**4**	**8,312**	**8,316**	**239,883**
696 Liquor Wine and Beer Stores	0	247	247	6,703
02 Retail Trade	*0*	*247*	*247*	*6,703*
08 Trade	**0**	**247**	**247**	**6,703**
703 Other Credit Agencies	0	21	21	128
01 Finance Industries	*0*	*21*	*21*	*128*
721 Insurance Carriers	0	20	20	740
02 Insurance Carriers	*0*	*20*	*20*	*740*
737 Real Estate Operators	0	70	70	2,475
03 Insurance Agencies and Real Estate Industries	*0*	*70*	*70*	*2,475*
09 Finance, Insurance and Real Estate	**0**	**111**	**111**	**3,343**
802 Elementary and Secondary Schools	0	1,680	1,680	32,290
01 Education and Related Services	*0*	*1,680*	*1,680*	*32,290*
821 Hospitals	0	928	928	24,644
828 Welfare Organizations	0	73	73	1,867
02 Health and Welfare Services	*0*	*1,001*	*1,001*	*26,511*

(continued)

APPENDIX I *(continued)*

INDUSTRY	*Number of Claims* *Fatal*	*Non-Fatal*	*Total*	*Days of Temporary Total Disability*
849 Miscellaneous Amusement and Recreation Services	0	60	60	1,355
04 Amusement and Recreation Services	*0*	*60*	*60*	*1,355*
866 Offices of Lawyers and Notaries	0	1	1	4
867 Offices of Management and Business Consultant	0	5	5	15
869 Miscellaneous Services to Business Management	0	1	1	1
05 Services to Business Management	*0*	*7*	*7*	*20*
899 Miscellaneous Services NES	0	3	3	132
08 Miscellaneous Services	*0*	*3*	*3*	*132*
10 Community, Business and Personal Service Industries	**0**	**2,751**	**2,751**	**60,307**
902 Defence Services	2	617	619	15,728
909 Other Federal Administration	1	1,223	1,224	20,613
01 Federal Administration	*3*	*1,840*	*1,843*	*36,340*
931 Provincial Administration	3	3,302	3,305	78,572
02 Provincial Administration	*3*	*3,302*	*3,305*	*78,572*
951 Local Administration	3	6,664	6,667	185,739
03 Local Administration	*3*	*6,664*	*6,667*	*185,739*
11 Public Administration and Defense	**9**	**11,806**	**11,815**	**300,651**
***Total for Schedule 2**	**13**	**23,272**	**23,285**	**612,218**

1 Industry Classification: Standard Industrial Classification 1970.

2 Days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated.

Source: Canadian Centre for Occupational Health and Safety – from WCB's Initial Settlement System.

APPENDIX J

Percentage Distribution of Disabling Injuries[1] Within Ontario and Canada[2] by Industry 1982-1984

	Ontario			*Canada*		
	1982	*1983*	*1984*	*1982*	*1983*	*1984*
Agriculture	1.4	1.5	1.4	1.1	1.2	1.2
Forestry	0.7	0.9	0.8	1.7	2.1	2.0
Fishing	*	*	*	0.1	0.1	0.1
Mines	1.8	1.6	1.5	2.6	2.5	2.3
Manufacturing	36.1	36.0	38.8	32.8	32.6	33.7
Construction	8.5	8.6	8.1	10.4	9.2	8.7
Transportation	11.2	10.6	9.8	9.3	9.1	8.7
Trade	14.5	14.6	14.5	13.4	13.9	14.4
Finance	1.0	1.0	0.9	0.7	0.8	0.7
Community	15.7	16.1	16.2	16.5	17.7	17.9
Public Administration	9.1	9.0	8.1	6.5	7.1	6.1
Unspecified	*	*	*	4.9	3.7	4.1
Total	100	100	100	100	100	100

1. Disabling injuries deemed to have occurred in the year indicated and accepted for payment by Workers' Compensation Board by the end of the first quarter of the following year.
2. All provincial Worker's Compensation Boards, excludes Yukon and Northwest Territories.

Source: Canadian Centre for Occupational Health and Safety from the National Work Injuries Statistics Program (Statistics Canada), March 1986.

APPENDIX K

Percentage Distribution of Disabling Injuries[1] Between Ontario and Canada[2] by Industry 1982-1984

	Ontario			*Canada*[2] *(excluding Ontario)*		
	1982	*1983*	*1984*	*1982*	*1983*	*1984*
Agriculture	40.2	40.9	40.0	59.8	59.1	60.0
Forestry	12.3	13.2	13.3	87.7	86.8	86.7
Fishing	5.5	5.6	4.0	94.5	94.4	96.0
Mines	20.1	20.2	21.0	79.9	79.8	79.0
Manufacturing	32.7	34.0	37.9	67.3	66.0	62.1
Construction	24.3	28.6	30.6	75.7	71.4	69.4
Transportation	35.5	36.3	37.0	64.5	63.7	63.0
Trade	32.2	32.4	33.1	67.8	67.6	66.9
Finance	39.8	39.1	38.8	60.2	60.9	61.2
Community	28.1	28.2	29.8	71.9	71.8	70.2
Public Administration	41.9	39.1	43.6	58.1	60.9	56.4

1. Disabling injuries deemed to have occurred in the year indicated and accepted for payment by Workers' Compensation Board by the end of the first quarter of the following year.
2. All provincial Worker's Compensation Boards, excludes Yukon and Northwest Territories.

Source: Canadian Centre for Occupational Health and Safety from the National Work Injuries Statistics Program (Statistics Canada), March 1986.

Ontario
Ministry of
Labour

Advisory Council
on Occupational Health
and Occupational Safety

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Volume

2

Ontario

Advisory Council on Occupational Health and Occupational Safety

Eighth Annual Report
April 1, 1985
to March 31, 1986

Volume 2

Containing Consultant's Report on
a Survey of Joint Health and Safety
Committees in Ontario

Mandate and Objectives

The function of the Advisory Council is and it has power to*:

a) make recommendations to the Minister of Labour relating to programs of the ministry in occupational health and occupational safety; and
b) advise the minister on matters relating to occupational health and occupational safety which may be brought to its attention or be referred to it.

To achieve this Council has set the following objectives:

Primary Objective
To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary Objectives
1. To ensure as far as possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as possible that there is appropriate manpower training and development for the occupational health and safety field.
5. To review periodically the effectiveness of the policies and programs implemented to achieve objectives 1 to 4. **

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*The Occupational Health and Safety Act s 10(7).
**added June, 1980.

Advisory Council on Occupational Health and Occupational Safety

Eighth Annual Report
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Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

INTERNATIONAL YOUTH YEAR 1985
ANNÉE INTERNATIONALE DE LA JEUNESSE 1985

Office of the
Chairman

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président

400 University Avenue
Toronto, Ontario
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416/965-2448

March 27, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
TORONTO, Ontario
M7A 1T7

Dear Mr. Wrye:

I am pleased to inform you that we will be transmitting the consultant's final report on the survey of joint health and safety committees to you very shortly.

I believe it is an important contribution to a subject on which very little research has been done and will provide a substantial basis for further consideration by council in developing its advice to you. It will also be of immediate interest to a wide range of people involved in occupational health and safety. Because of the interest generated by the survey, council considers it important to submit the consultant's report to you and to include it in this year's annual report.

In the meantime I would be pleased to meet with you to discuss the survey and council's plan with respect to further work in this area.

Yours truly,

DR McCalla

D. R. McCalla
Chairman

cc to: T. E. Armstrong
A. E. Robinson
B. Goodman

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

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400 University Avenue
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416/965-2448

May 8, 1986

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

I am pleased to forward to you the report of SPR Associates Incorporated on the results of the survey of joint health and safety committees in Ontario.

In addition to presentation of the survey findings, SPR's study team has provided its own interpretation of the results and recommendations for council's consideration. The report includes an executive summary and is divided into four parts. Part I, the introduction, sets out background of the study and the study methodology. Part II describes the current status of joint health and safety committees in Ontario. Part III addresses issues regarding operation, functioning and factors contributing to success of committees. The final section, Part IV, sets out the consultant's conclusions and recommendations.

Council is presently undertaking its own review of the survey findings and the consultant's report and, in due course, will be submitting to you its own report and recommendations.

Meanwhile, as I indicated to you in my letter of March 27, 1986, the study has generated a high level of interest and plans are now underway for its inclusion in council's Eighth Annual Report.

I believe the extensive data generated in this survey will provide a valuable basis for further investigation by council, the ministry and others concerned with occupational health and safety.

Yours truly,

DRMcCalla

D. R. McCalla
Chairman

Encl.

cc: T. E. Armstrong
A. E. Robinson
B. Goodman

An Evaluation of Joint Health and Safety Committees in Ontario: As Based on Mail Surveys of Worker and Management Members of Joint Health and Safety Committees in Over 3,000 Industrial, Mining, Educational and Health Workplaces

March, 1986

by
SPR Associates Incorporated/
National Mail Surveys Incorporated
Toronto, Ontario

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Thanks is due to the study Technical Advisory Committee, who worked closely with the consultant in developing all major aspects of the study in the period December, 1984 to March, 1986: Ms. Kathy Swinton (Chairman); Mr. Ken Glassco; Ms. Linda Jolley; Mr. Jerry Little; and Mr. John Miller. Special thanks is due to Ms. Anne Koven (Project Officer for the committee), who provided outstanding assistance and support to the researchers at every phase of the study. Similarly, the researchers would like to thank the staff of the Advisory Council on Occupational Health and Occupational Safety who provided invaluable assistance throughout the study: Mr. Mani Subramanian; Ms. Virginia Biggar; Ms. Gareth Perry; and Ms. Anne Carver.

Thanks is also due to Council's Task Force on the Implementation of the Occupational Health and Safety Act for its input at various stages: Dr. Carolyn Tuohy (Chairman); Mr. Al Barnes; Mr. R.T. Boldt; Mr. Joe Duffy; Mr. Peter Fisher; Mr. Jim Gill; Mr. Ken Glassco; Dr. Elizabeth Kaegi; Mr. Norm Lockington; Mr. Terry Meagher; Mr. Pat Rooney; Mr. Clarence Schmidt; Ms. Kathy Swinton; Mr. Malcolm Taschereau; and Mr. Ed Waddell.

As well, the researchers would like to thank: Mr. Norm Lockington (Dofasco) for his reviews and many suggestions; Mr. Ron Bowers (IAPA); Mr. Ed Waddell (OFL); Dr. Jim Turk (United Electrical Workers); staff of the Canadian Centre on Occupational Health and Safety: Mr. Peter Lewycky and Dr. Val Wuorinen; staff of the Ministry of Labour who provided outstanding assistance with computer programming throughout the study: Ms. Melanie Bickford; Mr. Ron Dyson; and especially Mr. Peter Cook.

The researchers would like to thank the thousands of worker and manager members of JHSCs who gave generously of their time to complete the extensive survey questionnaire required for the study.

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EXECUTIVE SUMMARY

1. INTRODUCTION

1.1 Background

In 1978, The Occupational Health & Safety Act was passed into law by the Legislature of the Province of Ontario. It came into effect in October, 1979. This Act specified a number of changes in legislation affecting the health and safety of Ontario workers on the job.

The most innovative requirement of the Act was to make mandatory the establishment of joint health and safety committees in most industrial, health and educational workplaces in Ontario. These committees (or **JHSCs**, as we refer to them in this report) were to provide a setting for management and workers to collaborate more effectively to improve health and safety. The JHSC system was introduced by the government as a method of affirming and strengthening "internal responsibility" (between management and labour) in the workplace. The JHSCs were to have certain limited rights and powers never before made legally available to workers.

Under the Act, committees were to be established in virtually all industrial workplaces, mines, health and educational establishments with more than 20 workers. Only offices, retail sales, restaurants, construction sites, and a small number of other categories of workplaces were excluded from the Act, so in fact, these provisions were extended to a very substantial number of workplaces. These changes affected the health and safety of over one million workers in over 7,000 workplaces.

1.2 Objectives of the Study

This study was conducted for the Ontario Advisory Council on Occupational Health and Occupational Safety, so that it might advise the Minister on ways in which joint health and safety committees could be improved. The overall objective of this study, as stated in the Terms of Reference, was as follows:

> Joint health and safety committees are one of the focal points of the Occupational Health and Safety Act. Since this legislation has been in place for almost six years,

> the Advisory Council believes that it is now an opportune time to conduct a survey of joint health and safety committees **with a view to evaluating the role of committees in fulfilling the purpose of the Act., i.e, the protection of workers' health and safety.*** (emphasis added)

Specific objectives included the following types of concerns: to describe the procedural and structural characteristics of joint health and safety committees; to describe information flow in the workplace; to describe the substantive issues, hazardous situations, recommendations, and management responses to these issues; to describe inspection activities of committees; to describe investigation of critical injuries and fatalities; to describe conflict resolution; to identify the factors associated with committee success; to assess the committee's perceptions of the role of the Ministry of Labour in facilitating and monitoring the progress of joint committees; to assess the consultation process required for designated substances; and to provide information for designing a follow-up study of JHSCs.

1.3 Methodology

The study methodology was centred on a systematic survey by mail questionnaire of management, and both worker and management JHSC members in a random sample of over 3,000 Ontario workplaces. Through these surveys, a picture was to be formulated of functioning, problems and perceived success of JHSCs.

The survey had three main questionnaires: a screening survey of managers, and separate but generally similar questionnaires for management and worker members of committees. The surveys involved multiple contacts (reminder mailings and telephone reminders to urge response), and achieved response rates of 93% for the initial survey of management, and of 76% for the subsequent survey of members of joint health and safety committees.

The target population for the survey was: all workplaces in Ontario, which are required under the Occupational Health and Safety Act (1978) to have joint health and safety committees, plus workplaces with 20 or more workers where a committee has been formed voluntarily, or by the Minister's order. The screening survey also included workplaces with fewer than 20 workers where a designated substance was present. This target population included nearly all industrial, mining, health, and educational establishments in Ontario. The target population excluded such workplaces as offices, retail stores, some restaurants, and construction sites, which are exempt from the requirement for JHSCs under the Act.

---

*From *Terms of Reference for a Survey of Joint Health and Safety Committees in Ontario*, Ontario Advisory Council on Occupational Health and Occupational Safety, 1984.

In total, the main sampling plan called for 2,850 workplaces to be drawn randomly, without replacement, according to a detailed allocation plan. The objective of that allocation was to draw a compromise between: (1) a sample to allow provincial-level estimates; and (2) a "fully crossed" sample with even numbers of cases, to allow more exact estimates for sub-groups, and to allow detailed multiple regression analyses designed to identify factors contributing to success of committees. As well, a separate sample (of an additional 200 workplaces) was surveyed to validate the sampling frame.*

The study relies extensively on reports of committee activity and subjective assessments of success and impact of JHSCs. While reliance on subjective indicators in the study leaves the issue of research with objective indicators of health and safety impact to future studies, the reliance here on "front line" wisdom, of those dealing with health and safety on a day-to-day basis, is seen as a particular strength of the study.

1.4 Reliability of the Resulting Data Base

Extensive tests were conducted to assess the reliability of the survey data. These included tests of internal consistency, management-worker agreement, and agreement between survey data and information from the administrative files of the Ministry.

Internal consistency tests indicated that estimates of reliability (Cronbach's Alpha) were between .7 and .9 for most indicators -- suggesting good reliability. Comparisons of management and worker data also indicated good levels of reliability for objective indicators. For example, management and worker member reports on presence of a union in the workplace were very highly correlated ($r =$ were also significantly correlated ($r = .55$), as were manager/worker reports of Ministry orders issued ($r = .46$), and worker/manager reports of JHSC inspections ($r = .41$). Generally, these responses of worker and management members could be predicted, one from the other, about 75% of the time, using discriminant analysis.**

These results, combined with test-retest estimates of reliabilities obtained in the pilot study, give the researchers a high degree of confidence in reliability of the study data.

---

*This sub-study focused on a sample of workplaces for which health and safety committee status is not clear in the Ministry of Labour Information System. (See *Appendix A: Section 2.4: Validation of the Sample Frame.)*

**Discriminant analysis is a multi-variate statistical technique related to multiple regression. A detailed explanation is provided in Appendix B.

2. SUMMARY OF DESCRIPTIVE SURVEY RESULTS

A number of important conclusions emerge from the descriptive survey results, for Chapters 3 to 9 of the report, and are reviewed below. Most of these are supported by both management and worker member data. These results point both to significant accomplishments since 1978 in establishing JHSCs. The results also point clearly to significant need for strengthening of committees, as a significant portion of JHSCs appear to be weak or ineffective.

2.1 Establishment of Committees

The study results indicate that JHSCs are established in most workplaces in Ontario where required, that is in over 90% of workplaces with 20 or more workers (see *Chapter 3*). These results lead us to conclude that it is highly feasible to establish JHSCs on an essentially universal basis in Ontario industrial, mining, health and educational establishments. Such an extension of JHSCs represents an important accomplishment of the 1978 Act.

One significant deviation from this pattern was in the area of committee establishment in very small workplaces with less than 20 workers, where designated substances are present. Our results for these workplaces showed a very different pattern, with survey results indicating establishment of committees in only 66.[illegible]% of workplaces identified as covered by this feature of the legislation.

2.2 JHSC Functioning

Most of the JHSCs in operation appear to be functioning generally as they are supposed to. They are having meetings, getting information, conducting inspections and investigations, acting on designated substances, and making recommendations. But problems exist for a substantial number of JHSCs:

1. Serious problems appear to exist in the communications process around JHSCs. JHSCs appear to be poorly linked with the workforce in most workplaces, and also poorly linked to management in many workplaces. In such workplaces, the existence of the JHSC may be deceptive as an indicator of effective internal responsibility.

2. In many workplaces, JHSCs face low levels of understanding and support from the workforce. This non-involvement is reflected widely in reports of management and worker members of JHSCs. This problem appeared to be correlated with the above lack of communication or process. In a substantial minority of JHSCs, it is reflected in management appointment of worker members to the JHSC, so that in fact, workers in those workplaces do not select their own representatives.

3. Worker members of JHSCs are reported to be significantly disadvantaged (compared to management members) in training, information, and apparently, contacts with Ministry inspectors. Because their resources appear to be far less adequate compared to those of management, workers are less able to make full contributions to the JHSCs.

4. Clarity of requirements of the Act regarding investigations appears to be poor. Actual conduct of investigations seems to be less than that required by the Act. This is a major area of concern.

5. The evidence suggests that considerable problems occur in the area of designated substances, and programs to control the hazard potential of these substances (at least as of Summer-Fall, 1985). These problems include some lack of awareness of what substances are present to begin with, and only partial implementation of assessments and control programs.

2.3 Compliance With the Act

As noted above, we have estimated that about 7% of Ontario workplaces with 20 or more workers which should have JHSCs, do not. Also non-compliance is very high, about 33% among workplaces with designated substances and less than 20 workers.

As well, compliance with specific provisions of the Act is poor among workplaces with JHSCs: only some 22% of workplaces with JHSCs appear to be in full compliance with the Act.

Overall, compliance with the Act is very incomplete. Relevant topics of improved education and better enforcement suggest themselves as important to future action to remedy these problems.

2.4 Perceived Success/Impact of JHSCs

A majority of JHSCs are regarded as successful by worker members, and/or management members. However, members do not always agree on success. In a substantial portion of workplaces, the JHSC is seen as successful by workers, but not managers, or vice-versa. Several considerations lead us to view this as reflecting underlying weaknesses in many JHSCs:

- Where communication is poor, where perhaps one side believes the process is working well, but the other (privately) feels that the committee is failing; or

- Where the committee is an arena for conflict, or where one side is perceived as the "winner" on most issues.

These results do not diminish the success of most JHSCs, but they warn us that where success is reported, it is often partial or fragile.

While most JHSCs are regarded by their members as successful, a substantial minority of committees are seen to have problems. The survey results suggest that workplaces might be roughly classified as follows:

58% of JHSCs are generally functioning well

30% of JHSCs are functioning adequately only

12% of JHSCs are functioning poorly or not at all

Considering the various problems noted above -- such as uneven functioning of JHSCs, areas of disagreement between management and worker members, and non-compliance with specific requirements of the Act -- the experiment with JHSCs must be regarded as only a partial success. Gains with JHSCs since 1978 appear to be impressive, but much in need of consolidation and upgrading.

2.5 Needs of JHSCs

Significant needs of JHSCs were identified by workers and management members. Generally, managers and workers agree that more support from workers, more training, and more information are high priority needs of JHSCs. Workers place additional emphasis on the need for: more time to study technical issues; more help/advice from the Ministry of Labour; and expanded authority for the JHSC.

2.6 Role of the Ministry

Several important findings emerged regarding the Ministry and particularly regarding variability in the role of the Ministry inspectors. The inspectors' role seemed to be variable or uneven on two points:

1. JHSC member reports indicate that inspectors vary greatly in their pursuit of the facilitator role outlined by the Ministry Operations Manuals; and

2. The data suggest very strongly that Ministry inspectors have more regular contacts with management members of JHSCs than with worker members (indicated by comparison of management and worker member reports).

A broader evaluation of the Ministry's inspection program is recommended in the concluding sections of this report for three reasons: (1) the Ministry's impact appears to be variable; (2) Ministry facilitation is important to the success of JHSCs (this importance is demonstrated in Part III of the report); and (3) some questions are raised about the accuracy of Ministry information on designated substances.*

---

*The surveys revealed indications that Ministry data on workplaces may be very incomplete, as regards the presence of designated substances. This proposition is rooted in reports by a large number of JHSC members that designated substances are present in workplaces identified by the Ministry as having no designated substances.

3. FACTORS AFFECTING JHSCS' FUNCTIONING AND SUCCESS

3.1 Objectives of the Regression Analysis

A key question posed for the study was: "what makes joint health and safety committees work -- what makes them more successful?" This question was seen to be of great importance for two reasons. First, experience with JHSCs is limited -- it was hoped that the study would offer insights into what makes committees work better, so that practitioners could use this information to improve their own committees. Second, it was anticipated that an analysis to demonstrate which features of committees contribute to success would be important knowledge for policy making on the part of the Ministry of Labour.

As is shown in Chapters 3 through 10, a substantial number of JHSCs are operating with only partial compliance with the Act, and only partial effectiveness. These concerns are significant. Most JHSCs could improve their performance substantially, and a significant minority of JHSCs are in serious need of change.

We approached the analysis of factors affecting committees at two levels: (1) recognizing that findings would be of significance to policy makers; and (2) drawing from a "young" but growing body of literature and a formal model of JHSC functioning (see *Section 1.3*).

Actual tests of our questions focused on two main dimensions of JHSCs: (1) JHSC functioning: the extent to which JHSCs are established, institutionalized and functioning, with routine processes, and completing basic functions; and (2) perceived JHSC impact: the extent to which JHSCs are seen by their members as being successful and having a positive impact on health and safety.

3.2 Summary Regarding Factors Which Facilitate JHSCs

Below we review the findings for Chapters 11 to 13. The factors examined in the regressions are divided into several general categories. Then, within each category, we consider those that seem to matter in functioning and impact, and (in a few cases) those which don't seem to matter. (Some of the findings of "no significant impact", are as interesting or more interesting than some of the findings of "significant impact".)

The criterion for treatment as an important facilitator is a significant regression co-efficient for the variable or indicator tested, for at least two different regression equations. Emphasis is also placed on those factors significant in both management and worker questionnaires (except for variables appearing on only one of the questionnaires and thus on only one of the sets of regressions).

Most important predictors of functioning and success emerged simultaneously in the independent regressions for worker member and management data, and most important predictors emerged regularly in a variety of sub-group regressions. These patterns -- simultaneous and recurring results -- are seen as suggesting good reliability of these regressions.

Firm/Organization Characteristics

Surprisingly, firm/organization characteristics were not very important predictors of either functioning or perceived impact. The principal firm or organizational characteristic important for JHSC functioning was the presence of a company health and safety policy or program, including a written component for workers. Economic strength (profitability, or related performance characteristics, such as expanding activity, for non-profit organizations) was also seen to have an influence on perceived impact.

Employee turnover, language difficulties, and experience were seen to have little effect on either functioning or perceived impact. Size of workplace was not clearly significant in its effects when other factors were controlled for.

Management Characteristics

Strong management understanding of and concern for health and safety appears to facilitate perceived impact of JHSCs although it does not generally have an effect on aspects of JHSC functioning such as taking minutes and conducting inspections (except for a positive impact on relationships among JHSC members). Management health and safety orientation thus appears to be a critical facilitator of success, which is consistent with previous research and "practice wisdom" in this field.

An unexpected finding was that actual involvement of senior management members in JHSCs seems to have no clear effect on JHSC functioning or success. In fact, some contradictory effects were noted. The important thing seemed not to be how management staffed the JHSC, but rather the overall commitment behind management's participation. Surprisingly, as well, management problem-solving and negotiating behaviour were not revealed as major factors affecting perceived success of JHSCs.

Labour Characteristics

Worker health and safety orientation (knowledge and understanding of Act and hazards) was seen to have a positive effect on perceived JHSC success, but not on functioning. Like commitment from management, worker health and safety orientation was also a critical facilitator of success. This finding may call for an important shift in "practice wisdom" and programs regarding JHSCs, to place greater emphasis on the workforce generally and its linkage to the JHSC.

Perhaps with good reason, early work with JHSCs had to focus on management, to obtain compliance with basic requirements etc. But perhaps as JHSCs become more established -- with basic institutionalization in place -- real progress becomes contingent upon the very broadly based responsibility system that includes an increasingly informed and concerned work force.

Unionization had minor, generally positive effects on both JHSC functioning and perceived JHSC success, the area of committee relationships excepted. Presence of a union had a negative effect on committee relationships. Apparently, presence of a union results in greater success of JHSCs, but at the cost of somewhat reduced cooperative process.

This suggests further that some JHSCs which are unionized are working within a conflict-negotiation model, but one which works perhaps as well as other models, with no intrinsically detrimental effects. As noted below, the analysis of overlap between the JHSC and collective bargaining roles suggests similar results.

To the researchers, these findings are also seen as reminding us that the JHSC process may not always be a process of cooperation alone. Inevitably, some health and safety issues may reflect differing interests of workers and management. In such cases, conflict may be unavoidable, the important question being: how can conflict be best resolved without destroying the JHSC process or weakening internal responsibility generally?

As was found for management, problem-solving and negotiating behaviour did not appear to have significant effects on JHSC success. These results were seen as consistent with the view that a variety of problem-solving models may work for JHSCs.

Committee Members' Training and Other Characteristics

More positive health and safety orientations among committee members were seen to have a very positive effect on JHSC functioning and perceived JHSC success. Scope of training was also seen to have a positive effect on functioning. Other factors were found to have scattered and minimal effects.

As was noted above, presence of senior management on the JHSC was found to have only modest effects as compared to overall management attitude towards health and safety.

Committee Structure

Committee structure was not a major factor influencing JHSC functioning or success, but some specific effects were noted: concentration of authority in a single chairperson has slight negative effects, especially in workplaces where labour relations are poor. As well, we found that having two or more workers (rather than one) contributes to institutionalization of JHSC processes.

Committee Information

Satisfaction with information about health and safety has an important positive effect on functioning and perceived success/impact of JHSCs. This was strongly reflected in both worker and management member analyses, and appeared to be a more important factor in workplaces that were regarded as more dangerous.

Thus, recent proposed changes in legislation to provide greater information in the workplace will no doubt be of value to JHSCs.

Committee Functioning and Institutionalization

Institutionalization of JHSC functions (regular meetings, formal procedures, taking minutes, etc.) was found to have a positive effect on perceived success of the JHSC. **This suggests the wisdom of many features of the current Act which reinforces institutionalization, and reaffirms the importance of improving compliance with those features of the Act.** Positive relationships in JHSC functioning were found to have a particularly strong effect in facilitating success/impact.

As well, frequency of inspection by JHSC members appears to greatly facilitate JHSC success/impact, a finding which could be of great importance to any review of the Act, given the Act's ambiguous treatment of inspection.

Formal Mandate and Decision-Making

Having written terms of reference for the JHSC was found to be a facilitator of institutionalization of committee functions.

Identification of the JHSC as a decision-making body also has a positive effect on perceived success/impact. Apparently, many workplaces have gone beyond the Act by treating the committee as a decision-making body rather than purely advisory, and in so doing, have conducted a useful experiment. Other workplaces may wish to follow this lead. In the same vein, a shift of legislation to facilitate a wider mandate could greatly improve effectiveness of JHSCs.

Committee Process

Surprisingly, problem-solving and negotiating behaviour between worker and management committee members were not clear factors in committee success. This was seen by the study team as further evidence for our conclusion that perhaps very different types of committee "models" or processes work for different types of workplaces.

Only one indicator reflective of a negotiating stance -- worker members caucusing before JHSC meetings -- was an important facilitator of perceived JHSC success/impact. Such caucusing was found to be a significant facilitator for every indicator of committee success examined. While such caucusing could certainly be used for planning and positive problem-solving, it may also allow for a more "free-wheeling" assessment of unique worker concerns with health and safety issues.

More importantly, findings reflect, in our view, the importance of structure in the internal responsibility system, and its capacity to mobilize information and other resources for problem-solving. Although cooperative problem-solving is central to the JHSC process, the effective linking of the different parties in the workplace may require institutions which sometimes mobilize contradictory interests. (see below).

Industrial Relations Climate

Good labour relations climate has a generally positive effect on positive committee relationships and perceived success of the JHSC. Positive labour relations climate was one of several key facilitators of both functioning and perceived success of JHSCs. Our data suggest that this is mainly through the impact of good labour relations on positive committee relations. (As well, our results in descriptive analyses indicated that members of a substantial number of JHSCs report that work on their committees has had an impact in improving labour relations.

Where labour relations are very poor, our analyses suggest that the work of the committee benefits more from internal strengths than is true for JHSCs generally (e.g. independent mandate, better relations among members). These data suggest that the Ham (1976), and Burkett (1981) hypothesis about keeping the JHSC separate from such tensions, may be appropriate for some workplaces where labour relations are very poor or where conflicts go unresolved, but as we note below, their hypothesis is rejected as a general rule.

Interestingly, a distribution of influence in the committee in favour of workers, appears to be a moderate facilitator of committee success in both manager and worker analyses. This reflects, perhaps, the central importance of worker input to the JHSC process that we have noted above. Perhaps where worker input is seen as more meaningul or more likely to have a real effect, more and better results generally are achieved by the JHSC.

Overlaps Between the JHSC and Collective Bargaining Roles

Ham (1976) and Burkett (1981), both placed great emphasis on the separation of the JHSC function from collective bargaining. They argued that overlap between collective bargaining processes and structure would introduce an inappropriate and destructive atmosphere into the ideally cooperative JHSC process.

This issue was examined in separate regressions for unionized workplaces only. Overlap between JHSC and collective bargaining was measured directly by asking management and worker members about the number of management and worker members who were also involved in collective bargaining or (on the labour side) who were union officers.

The results suggest that only mild effects were noted to result from overlap between the JHSC and collective bargaining roles. A single positive coefficient of labour relations/JHSC overlap was noted for one of four success/impact indicators examined for management members; a single negative coefficient was noted for one of four regressions conducted for worker members. (See *Chapter 12* and *Appendix B*, for details.)

These data seem not to support the position of Ham and Burkett. These results suggest that the advantages of using the structures of collective bargaining and the skill repertoire of those in the collective bargaining milieue may in most cases off-set the disadvantage of the conflict-negotiation model. This indicates that in a workplace where skilled leadership exists within collective bargaining structures, and where a repertoire of effective problem-solving skills reflects a negotiating approach, these skills can probably benefit the JHSC.

Of course, a different approach will be desirable where such skills are uneven, or poor generally, and different types of skills may be essential on JHSCs when labour relations for the workplace are very poor.

Level of Danger

Dangerous workplaces seem to have a higher level of JHSC functioning, but lower levels of perceived success/impact. The researchers see this finding as suggesting one or both of the following: (1) JHSC members in dangerous workplaces are using a tougher standard to evaluate their work; and (2) more difficult problems arise in such workplaces that may exceed the JHSCs' technical capacity or other resources (e.g. time).

These results are regarded as suggesting greater needs for training and information in dangerous workplaces, and possibly limits to the capacity of the JHSC itself. Perhaps Ham anticipated this type of problem when he noted: ". . . if the internal system of direct responsibility functions below some reasonable level of effectiveness, it may mean that the capacity of the organization is too limited to make use of the information provided by the committee . . ."*

The regression findings regarding level of danger lead us to view the needs of more dangerous workplaces as being perhaps very special. This, we suggest in Chapter 17, could be a specific topic for follow-up studies.

Ministry Activity

The presence of a proactive inspector was found to have a very positive effect on perceived JHSC success/impact, and on some aspects of functioning (institutionalization). Numerous other effects were illustrated, for example other linkages to Ministry (e.g. touring with inspectors) were important facilitators of success, but stronger enforcement action (e.g. issuing orders per se), had few effects. In virtually every area examined, the Ministry role appeared to be important to facilitation of JHSC functioning and success.

Significantly, the most important role for the Ministry in relation to JHSCs seems to be that of facilitator (advising JHSCs etc.), rather than enforcement (issuing orders). (This might also reflect some tendency on the part of most inspectors to rely on persuasion, and to regard issuing of serious orders as a "last resort".)

In whatever role, these results point strongly to the need for a stronger Ministry presence and a higher level of activity. These needs are addressed in the concluding portion of the study.

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*From: *Report of the Royal Commission on the Health and Safety of Workers in Mines*. James M. Ham, 1976, page 157.

4. RECOMMENDATIONS

The Technical Advisory Committee supervising the study has invited the study team to submit its observations and recommendations.

Accordingly, the following recommendations are submitted, as part of our report. It is hoped that these suggestions will aid the Advisory Council in formulating its recommendations to the Minister of Labour. These are by no means the only recommendations which could flow from the study data. New recommendations may come to the fore as the report is reviewed, and as new questions are asked, and even as new analyses may be undertaken.

In any case, the following are submitted to the Advisory Council as representing the study team's view of steps which might be taken to further the effectiveness of Joint Health and Safety Committees in Ontario.

These recommendations are interrelated, and reflect the view that effective JHSCs can only be developed in a comprehensive responsibility framework including a clear and effective role for government, and an internal responsibility system that works because it recognizes the sociological realities of the workplace.

Each recommendation is offered in conjunction with the study team's rationale, and a brief discussion.

4.1 Implementation of the Act

Recommendation 1: The Ministry Role and the Inspection Branch

> **A comprehensive evaluation of the Ministry's Inspection Branch, and its role in supporting JHSCs should be undertaken, to ascertain ways in which the Ministry's implementation of the Act as regards JHSCs could be improved.**
>
> Rationale and Discussion: The high degree of non-compliance with the Act evidenced by the surveys is a matter of major concern. The study results suggest that more effective educational and enforcement action by the Ministry would assist in remedying this problem. The path to effective application of the powerful tool which is the Inspection Branch, is a comprehensive evaluation of the Inspection Branch program.

Such an evaluation could be undertaken by the Advisory Council or another agency, and would assess the extent to which the suggested problems in the inspection program are valid, and the extent to which these arise from: lack of manpower alone (a very probable cause), or the extent to which other strategic factors also affect operation of the program.

The evaluation would address: (1) the appropriateness and possibility of strengthening the facilitative role of the Ministry, and particularly the specific manpower requirements of facilitative strategies outlined in the Ministry Operations Manuals; (2) the frequency of inspections; (3) more effective linkages to the JHSC, in general; (4) the even-handedness of contacts and information flow to worker and management members of JHSCs; (5) treatment of designated substances; (6) the Ministry's method of defining workplaces where this differs from organization of production or of the JHSC; and (7) comprehensiveness of coverage (i.e. how the inspection system can achieve more complete coverage of all workplaces). (See *Section 2.2.2* for related discussion.)

One factor limiting the Ministry's effect may be the fact that Ministry inspection resources appear to be concentrated on larger, unionized establishments, where JHSCs are better established, rather than on the unorganized sector and smaller establishments where problems appear to be greater.

The study results clearly point to the facilitative and aiding role of the Ministry as a key factor supporting the growth and effectiveness of JHSCs. Accordingly, this valuable capacity should be carefully explored and maximized. A comprehensive evaluation would achieve these effects.

4.2 Training, Education and Information

Recommendation 2: Training

Training programs in health and safety should be greatly expanded for members of JHSCs. This applies in particular to workers, who are greatly disadvantaged as regards training.

Rationale and Discussion: Our study results point to major gaps in training, expecially for workers, nearly 40% of whom have no health and safety training whatsoever. Training was identified as a highest priority need by workers and managers alike.

While an appropriate approach to dealing with this problem could be simply to expand existing programs, the question of evaluation also comes to the fore. Clearly, the programs which have operated over the past several years have not been sufficient to meet the needs. A comprehensive evaluation of the training programs of the safety associations, and of organized labour, possibly conducted under auspices of the Advisory Council, could provide useful insights regarding total demand, methods of delivery to reach those in need, and other issues.

Recommendation 3: Education of Managers and Workers Regarding Provisions of the Act

The Ministry and concerned parties (the safety associations and organized labour) should consider a program to educate management and workers on provisions of the Act related to JHSCs. The Act could also stipulate that popularized descriptions of rights and obligations under the Act be posted prominently in the workplace.

Rationale and Discussion: To a great extent, non-compliance by management is probably simply the result of management's unawareness of responsibilities. Ministry enforcement will assist in this area, but general educational efforts would also be of value. More general campaigns aimed at the workforce seem to be highly desirable, since reports of JHSC members suggest that worker knowledge of the Act (their rights and role within internal responsibility) is poor.

Some clarification of what is meant by "prominently", including number of locations or number of postings for large workplaces, or in each major work area, would aid in clarifying any requirement for posting of information, and could be applied also to the Act's requirement that names of JHSC members be posted.

Recommendation 4: General Education for the Workforce on the Importance of Health and Safety

The Ministry and concerned parties (organized labour and the safety associations) should develop new education programs to promote better worker concern and understanding of health and safety.

Rationale and Discussion: Our study results suggest that workers are highly variable in their concern for health and safety, that their concern is very low in many workplaces, and that JHSCs work best when support from workers is strong. JHSC members' identification of improved worker support as a major need of JHSCs, points to the desirability of strong action in this area.

Very possibly, the best method of targeting such education would be within the workplace itself, ideally with the JHSC as the educational initiator. JHSCs could provide such education if instructional models and materials were provided. Such a program might also require methods to provide funds or relevant resources to JHSCs, at least in the initial stages. Experimentation with a variety of approaches would probably be desirable, and supplementary educational effort through the mass media would also be supportive.

Recommendation 5: Information on Health and Safety Matters

Obstacles to full information on health and safety should be minimized through legislation and also through programs to facilitate provision of, and easy access to, existing information.

Rationale and Discussion: Information was identified as a high priority need for workers especially, and also for managers. It was also identified as a key factor facilitating success of JHSCs, particularly in dangerous workplaces. Issues of language and lack of literacy as possible obstacles should also be addressed. Implementation of the new proposed legislation, Bill 101, will be a start in this direction.

4.3 JHSC Structure

Recommendation 6: Committee Membership

The Act should require that at least two workers be on the JHSC.

Rationale and Discussion: This would facilitate improved contributions to the JHSC by workers, and is consistent with our findings in the regression analyses, that presence of two or more worker members aids institutionalization of JHSCs.

Recommendation 7: Committee Co-Chairpersons

JHSCs should be required to have two co-chairpersons, respectively chosen by management and workers.

Rationale and Discussion: This would have two effects: (1) to reduce the impact of concentrated power in a single chair, which was found in our regression analyses to have a negative impact on JHSC functioning; and (2) to facilitate worker involvement in JHSCs.

Partly as a matter of clarifying philosophical underpinnings of internal responsibility (much in need of reinforcement and elaboration in the Act), this step would underline the joint responsibilities of workers and managers, and also aid in raising the image of "importance" for worker JHSC members. This could improve the extent to which workers generally would regard the JHSC as serious and something they should contribute to.

Recommendation 8: Selection of Worker Representatives

The requirement for selection of worker JHSC members should be strengthened under the Act. Specifically, where they are not chosen by a union, the Act should require that worker JHSC members be provided work time to organize an annual meeting solely of workers, to select worker JHSC members.

Rationale and Discussion: This would curtail management involvement in selecting worker JHSC members. The importance of this feature of the Act (the selection of worker members) may warrant some method to verify this step, for example, a written declaration to be attached to the JHSC minutes, indicating that such an election was held, the declaration to be signed by a management and a worker member. The Ministry would provide information to workers on their rights in this respect, and perhaps arrange for elections to correspond with a visit of the Ministry Inspector, in cases where supervision would be a matter of concern.

4.4 JHSC Functioning

Recommendation 9: Inspections by JHSCs

The requirement for JHSC member inspections under the act should be strengthened, to allow for a minimum frequency of inspection, perhaps of once per month, with exceptions to be approved by the Ministry.

Rationale and Discussion: This is quite different from the current system, with its vague requirement and a maximum frequency of once a month. This would significantly increase the frequency of JHSC inspections. Since JHSCs were found to report greater success when committee inspections are more frequent, such a shift in strategy would be expected to improve effectiveness of JHSCs.

Recommendation 10: Investigations

Investigations of work refusals and critical injuries fatalities should be clarified, through a mandatory joint worker-manager report to be attached to JHSC minutes.

Rationale and Discussion: Such a report would be completed using a simple form prepared by the Ministry, and signed by both management and worker members of the JHSC. The study team believes that such a procedure would reduce confusion as to exactly what was done.

Recommendation 11: Time for JHSC Preparations

The Act should specifically allow worker JHSC members preparation time for meetings as an official function of the JHSC.

Rationale and Discussion: The regression analyses conducted for the study indicated a clear positive effect of advance meetings of worker JHSC members, in facilitating perceived success of the JHSC. When workers met ahead of time to plan, JHSCs were judged to be more successful.

As well, "more time to study technical information" was identified as something that "would help the JHSC", by 62.7% of worker members. Only more support from management and workers in general, more training, and more information were noted as being of more help than "time".

Recommendation 12: Management-JHSC Consultation

Management should be required to advise the JHSC of all health and safety policy and program developments within the employer's health and safety divisions (if any).

Rationale and Discussion: As was noted in the introduction to this report, an anomolous feature of the 1978 Act was that strictly speaking, it did not require management to consult with JHSCs generally on health and safety matters. The Act of course prescribes information management must provide and other supporting responsibilities. But strictly speaking, the Act could allow an employer to operate a general health and safety program in isolation from the JHSC.

Recommendation 13: Management Responses to Recommendations

Management should be required to reply in writing to all written recommendations made by the JHSC.

Rationale and Discussion: This would help to eliminate non-communication between management and JHSCs.

That this is in fact happening in some workplaces is strongly suggested by worker reports for some JHSCs, that JHSC recommendations are often rejected with no explanation (about 10% of JHSCs reported this). In such situations, the JHSC is clearly not working with management, and is merely a "show" of internal responsibility.

Recommendation 14: Effective Communication of the JHSC With Workers

To allow JHSCs to communicate more effectively with the workforce, these changes are recommended.

(a) minutes or other communications of JHSCs should be distributed to workers, at least quarterly;

(b) the right of workers to meet periodically with their JHSC members, on work time, to discuss work hazards or problems, should be included in the Act.

Rationale and Discussion: Better communication is much needed, to strength the information flow regarding health and safety, and to assure that the JHSC is an integrated portion of the internal responsibility system.

Poor communication with workers was noted to be a particular problem for committees, especially in non-unionized workplaces. Steps such as the above would greatly strengthen the communication process, and probably contribute to improved health and safety orientation in the workforce generally.

5. ISSUES AND FUTURE RESEARCH

5.1 Issues for Further Consideration

The recommendations section of the report includes discussion of a number of related issues, including the situation of small workplaces with designated substances, economic issues, and a general review of issues in developing the internal responsibility system.

5.2 Future Research

A number of suggestions are put forward for future research into specific topics of concern, including:

- A follow-up study of objective impacts of JHSCs on actual health and safety outcomes.
- Follow-up to compare perceived JHSC competence to standards of professional health and safety experts.
- Follow-up studies of specific types of workplaces such as those where JHSCs are operating in a more dangerous environment, where designated substances are present, where labour relations are poor, or where management and workers do not agree on the degree to which the committee is achieving success.
- Development of an on-going system for evaluation of JHSC performance, for the Ministry of Labour generally, and also for self-evaluation of JHSCs.
- Additional analysis of the data from this study.
- Development of an overall research plan or strategy for future research to guide the Advisory Council's efforts into this area.

PART I:
INTRODUCTION

1. BACKGROUND AND OBJECTIVES OF THE STUDY

A brief review of historical aspects of the emergence of Joint Health and Safety Committees (JHSCs) is provided here, as background to the reader, and as an introduction to study objectives.

1.1 STUDY BACKGROUND

1.1.1 Mandated JHSCs: Historical Context

Prior to 1976 JHSCs were a relatively limited feature of industrial health and safety in Ontario. Generally, they were found only in unionized or very large workplaces. The majority of these were created through collective bargaining. The Employee's Health and Safety Act (1976), for example, provided an initial basis for establishment of JHSCs, but provided for discretionary committees only.

The Occupational Health & Safety Act was passed into law by the Legislature of the Province of Ontario in 1978, and came into effect in October, 1979. This Act specified a number of changes in legislation affecting the health and safety of Ontario workers on the job.

The most innovative requirement of the Act was to make mandatory the establishment of joint health and safety committees in most industrial, mining, health and educational workplaces in Ontario. (See below for a discussion of exceptions.) These committees (or JHSCs, as we refer to them in this report) were to provide a setting for management and workers to collaborate more effectively to improve health and safety. The JHSC system was introduced by the government as a method of affirming and strengthening "internal responsibility" (between management and labour) in the workplace. The JHSCs were to have certain limited rights and powers never before made legally available to workers.

Under the Act, committees were to be established in virtually all industrial workplaces, mines, health and educational establishments with more than 20 workers.* Only offices, retail sales, restaurants, construction sites, and a small number of other types of workplaces were excluded from the Act, so that these provisions were extended to a very substantial number of workplaces. These changes affected the health and safety of over one million workers in over 7,000 workplaces.

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*Initially, not all workers in educational establishments were covered by the Act.

In fact, these were important changes for some 60% of Ontario industrial workplaces which had no joint health and safety mechanism prior to 1978.* These tended to be the smaller, non-unionized workplaces. In these workplaces, management was suddenly obliged by the Act to aid in the creation of a new type of structure -- one that had never existed before. It was to be a structure within which workers and managers together would share certain rights and functions that, until 1978, had been the general domain of management only. In such workplaces, the potential of the Act to improve health and safety was great. Obstacles as well were noteworthy, since management might, in many cases, object to sharing its prerogatives, and since experience in running such committees was essentially non-existent in such workplaces.

In a smaller proportion of Ontario workplaces (perhaps 40% of all industrial workplaces) joint health and safety committees or very similar structures were already in existence. These tended to be operating in larger, and unionized establishments. In these workplaces too, however, the Act had potential for impact: the structure and mandate of many of these JHSCs were modified by the Act, particularly the enshrinement of certain rights and responsibilities of JHSCs in legislation.

It must not be forgotten that in a small number of these workplaces, JHSCs and their underlying principles of "internal responsibility" and joint manager-worker problem-solving, were firmly established in 1978. In many such workplaces, the role of these JHSCs went beyond even the powers prescribed in the Act. But for most Ontario workplaces, the Act presented a significant departure from historical practice, so that the wide mandating of JHSCs constituted a major industrial experiment.

1.1.2 Key Factors Behind the Mandating of JHSCs

Rising Concerns With Health and Safety

Numerous factors lay behind the passage of this important piece of legislation. The decade of the 70's witnessed a rising tide of concern with occupational health and environment. It also witnessed substantial labour-management conflict. Industrial health became a major issue in the Ontario legislature. Health and safety in the workplace became an increasingly tumultuous intersection of these forces, as a continuous round of research began to verify the importance and potential deadlines of many industrial diseases.

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*See *Chapter 3, Display 3.2,* for statistics which are used to estimate the percentages of workplaces with committees as of 1978. The estimate is based on the percentage of workplaces in operation in 1985 which reported having committees in 1978.

The 'Ham' Commission

One significant interpretation of these issues was evidenced in the *Report of The Royal Commission on the Health and Safety Workers in Mines* (Ontario, 1976), by Commissioner James Ham of the University of Toronto. His conceptualization of health and safety drew strongly on the evidence of problems in health and safety in Ontario, and also European experience, particularly JHSC models in Sweden.

His report, while focused on mining operations, touched on many general aspects of health and safety, including such matters as: information; causes of disease and accident; role of labour and management; and the roles of government.

Most importantly for our discussion of JHSCs, his report closely critiqued what he termed the responsibility system, including government and all parties in the workplace; and the internal responsibility system in the workplace, including management and workers alike. Both systems of responsibility, he argued, needed to work effectively to assure adequate protection of health and safety. He described key elements of the broader responsibility system in some detail.

> The scope of this responsibility-system is related to five basic factors which, in the Commission's opinion, together determine the levels of occupational risks in our mines. Whether in the home or the factory, on the highway, or in the mine, there is no attainable state of absolute health and safety. There are levels of risk accepted or tolerated to a degree by the parties concerned. ... the acceptable levels of occupational risk are determined by: (1) the quality and kind of industrial management and supervision; (2) the degree of participation and commitment from employees, individually and collectively in labour unions or otherwise; (3) the state of social expectation and concern in mining communities and in the public at large; (4) the measure of political attention as expressed in legislation, in the related governmental administrative practices for monitoring compliance, and in the provision of compensation; and (5) the combined effectiveness of the above parties in operating as a system.*

His argument, based to a great extent on concepts of natural justice and an analysis of the sociology of work process, was that a high level of shared management-worker responsibility -- the internal responsibility system -- was critical to effective improvement of health and safety in the workplace. Ham concluded from his research that the internal responsibility system was not working properly:

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*From: *Report of the Royal Commission on the Health and Safety of Workers in Mines*, James M. Ham, 1976, page 5.

> The responsibility-system seems to have been lacking in two significant ways. First, divided jurisdictions have made it unclear where the initiative necessary to deal with problems is to be taken. Second, the worker as an individual and workers collectively in labour unions or otherwise have been denied effective participation in tackling these problems; thus the essential principles of openness and natural justice have not received adequate expression. Participation may be understood in terms of the following three major elements: (1) knowledge -- having ready access to information about actual and expected conditions at the workplace, and about the state of the health of the workers; (2) contributive responsibility -- to provide individual and collective insight on problems on the basis of knowledge and work experience; and (3) direct responsibility -- to make operative decisions that influence conditions at work.*

Ham argued for a significant re-balancing of worker and management roles as an essential step to make internal responsibility work. Ham appeared to have been concerned as well, that worker concerns be directed into a cooperative process, as he argued in his summation regarding joint health and safety committees:

> Within the internal responsibility-system at the company level, which is the key to the quality of the overall control of occupational hazards, there has been in many companies an inadequate opportunity for workers to contribute their insight on the assessment of work conditions and to the basis on which management makes decisions on issues of health and safety....
>
> The Commission has carefully defined a framework for the operation of joint labour-management health and safety committees as bodies contributive to the formulation and review of sound managerial policies and practices.**

Incorporating a number, but not all, of his specific recommendations, the Occupational Health and Safety Act (1978) established internal responsibility, and Joint Health and Safety Committees as central features of Occupational Health and Safety policy for Ontario.

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*From: *Report of the Royal Commission on the Health and Safety of Workers in Mines.* James M. Ham, 1976, page 6.

**From: *Report of the Royal Commission on the Health and Safety of Workers in Mines.* James M. Ham, 1976, page 250.

1.1.3 Specific Provisions of the Act

The Occupational Health and Safety Act (1978) stipulated the following main points regarding JHSCs and their duties:

- JHSCs were required in virtually all industrial, mining, health, and educational establishments with 20 or more workers.
- Workers would be at least half of the members, and would be chosen by fellow workers or their union.
- JHSCs were required to meet at least four times a year and keep minutes.
- While advisory, JHSCs were provided with certain rights and duties as regards: access to information; inspections; designated substances; investigation of accidents; and investigation of work refusals.

1.1.4 Other Features of the Act

Significant Rights for Workers: The Right of Refusal

In the Act, a worker was provided with the right to refuse work which might "endanger himself or another worker", subject to investigation of the validation of the presumed health or safety danger (Section 23 of the Act). For many, this right was regarded as a very major change for workers.

Workers were also protected against reprisals where a worker acted in compliance with the Act (Section 24 of the Act).

Some Anomalies

Some other features noted by reviewers include certain gaps or anomalies in the Act. Two of particular interest are:

1. JHSCs are suggested as an arena for general co-operation between management and labour but the Act does not specifically require that management consult with the JHSC on health and safety matters (except as regards designated substances assessment and control programs).

2. Although the tone of the Act suggests that JHSCs should inspect the workplace, this is not completely clear. Indeed, an upper limit is placed on frequency of inspections: JHSCs are "to inspect the workplace not more often than once a month" (emphasis added), and the specific wording seems to allow a JHSC to decide not to inspect the workplace.*

These two gaps in the Act represented important differences from the somewhat more comprehensive internal responsibility system which Ham had begun to sketch out, and especially his specific attention to the inspection function as a very distinct job, to be carried out by specialized "worker auditors".

Self-Regulation as a Goal

A more important departure from Ham's analysis and intent was evidenced in the government's view of where internal responsibility would lead.

The philosophical premise of the government which introduced the legislation appears to have been that internal responsibility and JHSCs would become the first steps in an evolutionary course to primary reliance on self-regulation by industry generally. Essentially, the development of internal responsibility was seen by the government as promising a relative decline in the need for government intervention in health and safety.

This aspect of the Act was a significant departure from Ham's concept of the overall responsibility system as providing key roles for management and labour in the workplace and government as regulator and arbitrator of disputes.

1.1.5 Program Development: Controversy and Uncertainty

Program Development

Since implementation of the Act in 1979, several types of actions have been taken to ensure implementation of the Act and to assure success in the significant experiment represented by JHSCs:

1. The roles of the inspector and the Industrial Health and Safety Branch were reconceptualized in revisions

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*Ministry staff, however, indicate their interpretation is that a JHSC should inspect the workplace at least annually.

to the Operations Manuals emphasizing the Ministry of Labour inspectors' role as facilitator of internal responsibility.

2. Substantial Workmen's Compensation Board funds have been applied by the industrial health and safety associations to promote understanding and development of JHSCs by management.

3. Substantial effort has been made by organized labour to educate its members regarding JHSCs and relevant health and safety matters.

4. The Ministry of Labour has established a conciliation service to deal with disputes in JHSCs.

Controversy and Uncertainty

Controversy has also surrounded implementation of the Act. Organized labour has been suspicious of the province's intent of self regulation, as one of "leaving workers at the mercy of management", particularly in non-union establishments. Management in some firms has obstructed the expansion of workers' rights and roles. In other cases, where workers are complacent or uninterested in the health and safety issues, management has questioned the benefits of the JHSC system.

Uncertainty about how JHSCs actually work has made informed evaluation of the internal responsibility system difficult at best. No objective evidence has been available to clarify just how well JHSCs are working or under what conditions they work effectively.

Many related questions are unanswered. Are JHSCs actually operating everywhere intended or are there many areas of non-compliance as regards the creation of JHSCs? Are the JHSCs that do exist having significant effects? Or is the compliance often one of form, with many committees being merely "paper" committees? Are JHSCs doing important work which improves health and safety, or are many JHSCs merely engaged in housekeeping? How are JHSCs affected by labour relations climate? Has the effort to implement this important industrial experiment been sufficient to allow it to succeed?

This report provides some initial answers to these very important questions.

1.2 IN 1985: AN EVALUATION OF PROGRESS WITH JHSCS

1.2.1 Study Objectives

The overall objective of this study, as stated in the Terms of Reference, was as follows:

> Joint health and safety committees are one of the focal points of the Occupational Health and Safety Act. Since this legislation has been in place for almost six years, the Advisory Council believes that it is now an opportune time to conduct a survey of joint health and safety committees **with a view to evaluating the role of committees in fulfilling the purpose of the Act., i.e. the protection of workers' health and safety.*** (emphasis added)

Specific research questions to be examined originally included the detailed questions in Display 1.1 (next page).* By virtue of the study's testing of a variety of linkages of JHSCs to the workplace, the study could also be seen to be a test of Ham's more general hypotheses, that internal responsibility could work and that it could be fostered by government action.

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*From *Terms of Reference for a Survey of Joint Health and Safety Committees in Ontario*. Ontario Advisory Council on Occupational Health and Safety, 1984.

DISPLAY 1.1
DETAILED QUESTIONS FOR THE STUDY

(a) to describe the procedural and structural characteristics of joint health and safety committees in Ontario, e.g. size, frequency of meetings, selection, training and turnover of members, publication of minutes;

(b) to describe information flow in the workplace among management, labour and the committee;

(c) to describe the substantive issues dealt with by committees, e.g. identification of hazardous situations, recommendations regarding new procedures and equipment, and management responses to these issues;

(d) to describe inspection activities of committees, particularly those pertaining to the designated worker representatives;

(e) to describe the methods for informing and involving designated worker representatives in the investigation of critical injuries and fatalities;

(f) to describe experience with conflict resolution in the committees;

(g) to identify the factors associated with differences among committees with regard to (a) to (f) above;

(h) to relate differences in committee functioning to differences in the sources and level of management and labour information regarding health and safety conditions in the workplace and regarding their own rights and responsibilities;

(i) to assess the committee's perceptions of the role of the Ministry of Labour in facilitating and monitoring the progress of joint committees;

(j) in appropriate workplaces to assess the consultation process required under the designated substances' assessment and control programs;

(k) to assess programs deemed by the Ministry of Labour as equivalent to joint health and safety committees in the terms outlined in (a) to (i) above; and

(l) to provide information that may be required for designing a follow-up study consisting of on-site interviews.

1.3 A THEORETICAL MODEL OF THE FUNCTIONING OF JHSCS

The research began with an attempt to refine a "model" or theory of functioning of JSHCs. Such a model was formulated from existing research in Canada, the United States and the United Kingdom, and took the general form seen in Display 1.2 (next page), where arrows represent the presumed direction of influence.*

Each element in this model was based on previous research findings on joint health and safety committees.** For example, Kochan's study (of joint health and safety committees in unionized workplaces in Michigan) indicated that external pressure from government (in the United States) had a noteworthy impact, and that management commitment and union strength were important predictors of committee functioning.

Similarly, previous studies have suggested important impact of: management and labour attitudes towards health and safety; industrial relations climate; industry and firm characteristics; and the level of danger in the industry.

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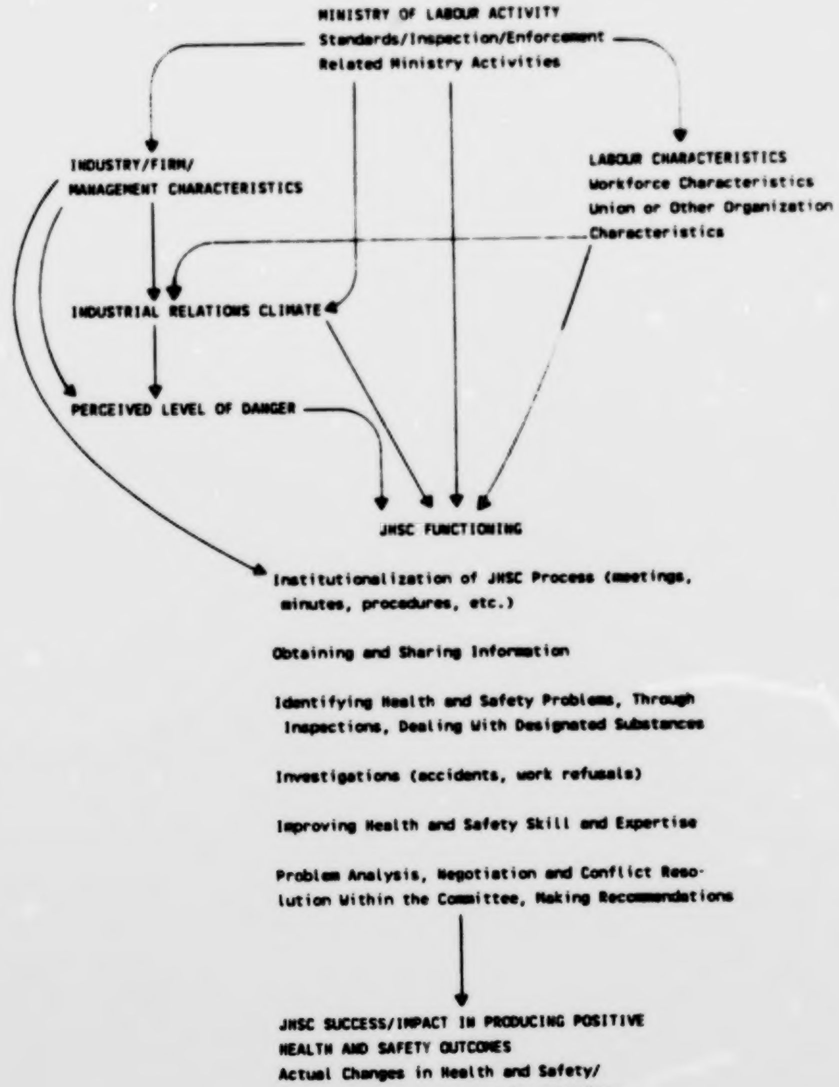
*The reader should note that some uncertainties surround most such discussions of direction of influence or causality. Generally, a causal relation is suggested, or may be inferred, from correlations such as those found in various research studies, but causal relations can only be demonstrated with full confidence through experiments. See Part III for further discussions of correlation and causality.

**Key studies included: *The Determinants of Effective Joint Health and Safety Committees*, P.B. Beaumont, J.R. Coyle, J.W. Leopold, and T.E. Schuller, Center for Research in Industrial Democracy and Participation, University of Glasgow, May, 1982; and *The Effectiveness of Union-Management Safety and Health Committees*, Thomas A. Kochan, Lee Dyer and David B. Lipsky, September, 1977. Also of value were exploratory studies previously conducted in Alberta and Ontario: *Characteristics of Voluntary Occupational Health and Safety Committees in Ontario, 1977-1978*, Ontario Ministry of Labour, 1978; and *An Initial Review of the Joint Worksite Health and Safety Committee Program*, Alberta Department of Labour, 1979.

DISPLAY 1.2

MODEL OF FACTORS INFLUENCING FUNCTIONING OF JOINT HEALTH AND SAFETY COMMITTEES


MINISTRY OF LABOUR ACTIVITY
Standards/Inspection/Enforcement
Related Ministry Activities
INDUSTRY/FIRM/
MANAGEMENT CHARACTERISTICS
LABOUR CHARACTERISTICS
Workforce Characteristics
Union or Other Organization
Characteristics
INDUSTRIAL RELATIONS CLIMATE
PERCEIVED LEVEL OF DANGER
JHSC FUNCTIONING
Institutionalization of JHSC Process (meetings, minutes, procedures, etc.)
Obtaining and Sharing Information
Identifying Health and Safety Problems, Through Inspections, Dealing With Designated Substances
Investigations (accidents, work refusals)
Improving Health and Safety Skill and Expertise
Problem Analysis, Negotiation and Conflict Resolution Within the Committee, Making Recommendations
JHSC SUCCESS/IMPACT IN PRODUCING POSITIVE
HEALTH AND SAFETY OUTCOMES
Actual Changes in Health and Safety/
Perceived Changes in Health and Safety

1.4 ORGANIZATION OF THE REPORT

The report is organized into four main parts (I to IV), containing 17 chapters. General content is as noted below and as detailed in Display 1.3.

The balance of Part I describes the methodology: how the study was done, indicators of reliability of the resulting data base, and notes on the presentation of results. Part II describes the current status of Joint Health and Safety Committees in Ontario, in workplaces of 20 or more workers where they are required. It answers key questions such as: How are committees functioning? How well are JHSCs fulfilling the purpose of the Act? Part III addresses key questions such as: What factors appear to make committees work? What factors seem to facilitate committee success? It is hoped that these results will illuminate ways in which joint health and safety committees in Ontario might be made more effective. Part IV provides the conclusions and recommendations of the research team, which are offered for consideration by the Advisory Council, practitioners, and policy makers. Suggestions for future research are also outlined.

DISPLAY 1.3

PLAN OF THE REPORT

PART I: INTRODUCTION

1. Background and Objectives of the Study
2. Study Methodology

PART II: THE CURRENT STATE OF JOINT HEALTH AND SAFETY COMMITTEES (JHSCs) IN ONTARIO

3. Patterns of JHSC Establishment
4. Characteristics and Functioning of JHSCs
5. JHSC Process: Committee Relationships, Problem-Solving, Negotiation, and Investigations
6. Relationships of the JHSC to the Workplace and the Ministry of Labour
7. Assessments of Perceived Success/Impact
8. Overall Compliance With Legislation
9. Assessments of Needs
10. Summary of Descriptive Survey Results

PART III: WHAT AFFECTS OPERATION, FUNCTIONING AND SUCCESS OF JHSCs

11. Factors Affecting JHSCs' Institutionalization/Functioning
12. Factors Affecting Success/Impact of JHSCs
13. Some Supplementary Regression Analyses
14. Summary Regarding Factors Which Facilitate JHSCs

PART IV: CONCLUSIONS AND RECOMMENDATIONS

15. Conclusions
16. Recommendations and Issues
17. Research: Next Steps

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2. STUDY METHODOLOGY

2.1 INTRODUCTION AND OVERVIEW

The study methodology was centred on a systematic survey by mail questionnaire of management, and both worker and management JHSC members in a random sample of over 3,000 Ontario workplaces. Through these surveys, a picture was to be formulated of functioning, problems, and perceived success of JHSCs.

The survey had three main questionnaires: a screening survey of managers, and separate but generally similar questionnaires for management and worker members of JHSCs. The surveys involved multiple contacts (reminder mailings and telephone reminders to urge response), and achieved response rates of 93% for the initial survey of management, and 76% for the subsequent survey of members of joint health and safety committees. Design of questionnaires and eventual analysis of the data was oriented by a model of JHSC functioning and success impact derived from previous literature. (See *Section 1.3: A Theoretical Model of the Functioning of JHSCs.*) Extensive data were collected, with questionnaires of 4 pages in length for management, and of 14 to 15 pages for committee members. (See *Section 2.3: Survey Process*; and *Section 2.4: The Survey Questionnaires.*)

Several aspects of the study methodology are described here in detail, particularly target population and sampling; the survey process; the questionnaires; and the reliability of the resulting data base.

2.2 TARGET POPULATION AND SAMPLING

2.2.1 Target Population

The target population for the survey was: all workplaces in Ontario, which are required under the Occupational Health and Safety Act (1978) to have joint health and safety committees, plus workplaces with 20 or more workers where a committee has been formed voluntarily, or by the Minister's order.* This population includes nearly all industrial, mining, health, and educational establishments in Ontario, it excludes such workplaces as offices, retail stores, some restaurants, and construction sites, which are exempt from the requirement for JHSCs under the Act.

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*The screening survey also included workplaces with fewer than 20 workers where a designated substance was present.

Because most workplaces with JHSCs are those which have 20 or more production workers, and because these are required to have JHSCs, this group is regarded as the main target population for this study, with secondary attention given to other categories of workplaces: those with voluntary committees; and those with less than 20 workers with designated substances. The detailed survey and results presented in Chapters 3 to 14 are focused on the main target population of eligible workplaces with 20 or more production workers.

2.2.2 Sampling

Overview of the Main Sampling Strategy

A main sampling plan was prepared by SPR Associates for workplaces with 20 or more production workers (and required to have a committee under the Act).* This sampling plan allowed for comparisons of estimates among the following main strata:

- o Presence or absence of designated substances.
- o Union versus non-union workplaces.
- o Five size groups (1-19 workers**; 20-75; 76-249; 250-499; and over 500 workers).
- o Mandatory versus voluntary committees, versus committees established under Minister's order.
- o 27 SIC (Standard Industrial Classification) groups, which are sub-strata within the main strata noted above.

The population sampled from, and the number of workplaces sampled, are shown in Display 2.1 (next page). These stratification data were drawn from the Computer Information System of the Industrial Health and Safety Branch, and the Mining Health and Safety Branch, Ontario Ministry of Labour. Actual selection was also done within the same information system, with programming assistance provided by the Ministry of Labour.

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*This sampling plan adapts portions of a previous sample design prepared by York University Institute for Social Research. Changes from the York sampling plan resulted primarily from the Council's decision to include presence of designated substances as a factor in sampling design.

**Applied only to workplaces with designated substances. As is noted below, this group of small workplaces with designated substances was sampled only in the screening phase of the survey, and not in the more detailed committee member survey.

In total, the main sampling plan called for 2,830 workplaces to be drawn randomly, without replacement, according to a detailed allocation plan. The objective of that allocation was to draw a compromise between: (1) a sample to allow provincial-level estimates; and (2) a "fully crossed" sample with even numbers of cases, to allow more exact estimates for sub-groups, and to allow detailed multiple regression analyses designed to identify factors contributing to success of committees. As well, a separate sample (of an additional 200 workplaces) was surveyed to validate the sampling frame.*

Significantly, as can be seen in Display 2.1, the final sample tended towards equal numbers of cases within each major stratum (rows or columns of Display 2.1). As well, it should be noted that a 100% sample was taken from smaller cells, such as those for larger workplaces with over 250 employees.

Adjustments in the Sampling Frame

Some adjustments in the sampling frame were required because: (1) some workplaces sampled were not eligible (for example, because they had less than 20 workers and did not have designated substances); (2) special treatment was required for complex committee structures (e.g. where several JHSCs were found in a single workplace); and (3) where one committee was found to serve 2 or more workplaces (see *Appendix A*, for details).

The Problem of Defining the Workplace

Initial field contacts in the pilot study alerted the researchers to the occurrence of frequent discrepancies between the definition of the workplace by JHSCs, as compared to the Ministry of Labour.

Often, a workplace defined as a single workplace for Ministry inspection purposes, was divided by a JHSC into several sub-areas. As well, the reverse situation occurred frequently where a single JHSC served, what from the Ministry's point of view were, several "workplaces". Even greater discrepancy occurred in some large establishments where JHSCs were organized on departmental lines while for inspection purposes, the workplace was divided into physical zones (e.g. buildings, plant areas, etc.).

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*This sub-study focused on a sample of workplaces for which health and safety committee status is not clear in the Ministry of Labour Information System. (See *Appendix A: Section 2.4: Validation of the Sample Frame.)*

DISPLAY 2.1

TOTAL POPULATION OF WORKPLACES REQUIRED TO HAVE JHSCs, AND SAMPLE DRAWN

(For each cell, the number sampled is the top number indicated, and the population is the bottom number indicated)*

	Less Than 20 Workers	20 to 74 Workers	75 to 249 Workers	250 to 499 Workers	Over 500 Workers	Totals
Unionized, no designated substances		(230) 1,951	(230) 1,092	(192) 192	(120) 120	(772) 3,355
Non-unionized, no designated substances		(230) 1,921	(230) 544	(65) 65	(23) 23	(548) 2,553
Unionized, with designated substances	(70) 70	(235) 384	(231) 456	(190) 190	(158) 158	(884) 1,258
Non-unionized, with designated substances	(70) 484	(234) 353	(145) 145	(35) 35	(16) 16	(500) 1,033
Unionized, with voluntary committees		(36) 222	(22) 73	(3) 3	(0) 0	(61) 298
Non-unionized, with voluntary committees		(50) 105	(15) 45	(14) 14	(6) 6	(85) 170
Totals	(140) 554	(1,015) 4,936	(873) 2,355	(499) 499	(323) 323	(2,850) 8,667

*Blank cells were not examined in the study, 2 cells were sampled only for the screening survey of managers.

Impact of these varying definitions could not be assessed in this study but may be an issue for evaluation or future research (see Chapters 16 and 17), if such differences in structure affect the Ministry's ability to work effectively with JHSCs.

Gaps in the Sampling Frame

Previous research by the Advisory Council had suggested that the Ministry of Labour information system might "miss" about 10% of Ontario workplaces.* Our analysis of the "X" workplace sample (see *Appendix A*, Section 2.4) suggested that an additional 20% of eligible workplaces are perhaps mis-classified as "X" category workplaces, since they appear to be similar to other workplaces covered by JHSC provisions of the Act.

2.2.3 Coverage of the Study Sample: Number of Workplaces and Workers Studied

Because single committees often serve several workplaces, the JHSCs we surveyed actually served a larger number of workplaces, and a correspondingly larger number of workers, than originally expected.

Our estimate is that the final sample covered about 250 workplaces without committees,* and approximately 3,800 workplaces, covering 900,000 production workers, with committees.

This "expansion" of the study sample seemed to be especially common for large industrial, mining, health and educational structures, so that the study included a very large proportion of all workers covered by the JHSC provisions of The Occupational Health & Safety Act (1978).

Because the study encompasses a random sample of a very large proportion of Ontario's industrial, health and educational establishments, and a large portion of their workers, representativeness of the sample is stronger. Reliability and significance of study results is therefore greatly enhanced.

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*Personal Communication, Anne Koven, Advisory Council on Occupational Health and Safety.

2.3 SURVEY PROCESS

2.3.1 Questionnaire Development

Questionnaires for the study were developed from the following three sources:

1. Questions raised by the Advisory Council and the Technical Advisory Committee regarding the operation and effectiveness of committees.
2. Models of joint health and safety committee processes found in the existing literature* on joint health and safety committees.
3. Observations on joint health and safety committee processes offered by key informants interviewed in the course of background research for the design stage of the study.

Questionnaires were developed through the integration of these three resources by the study consultant. Subsequently, the questionnaire drafts (and implicit models of the joint health and safety committee process) were reviewed by a three tier supervisory group including representatives of management, labour, and technical/professional persons knowledgeable about occupational health and occupational safety (i.e. Study Technical Advisory Committee, reporting to the Council Task Force on Implementation of the Occupational Health and Safety Act, reporting in turn to the Advisory Council itself).

Because the issues involved in joint health and safety committees are complex, very long and complicated questionnaires resulted (see *Appendix C* for actual questionnaires).

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*Some studies of particular interest included research conducted in Michigan, and the United Kingdom (see *Section 1.3 for more details*).

2.3.2 Pilot Study

A Full Pilot Study

A full-scale pilot study preceded the administration of the main survey.

The pilot study involved conducting the complete study in reduced format, with 120 workplaces, randomly chosen from across Ontario. As noted below, this involved several mailings to each workplace, with the survey conducted in two stages. Each workplace generated both a "worker members' response" and a "management members' response" for each committee.

Results of the Pilot Study

Analysis of the pilot study data provided empirical evidence on the workability of specific questions, and also provided an informed basis for assessing the relative value and reliability of the many questions being tested. This analysis took the form of:

1. Examining answer distributions, which allowed us to identify questions that did not obtain adequate variance.
2. Examining correlations between questions and "success indicators" to see if expected predictors show correlations in the expected direction.
3. Formal tests of reliability (see **Appendix A**) including tests of internal consistency, correlation of manager and worker data and test-retest reliabilities.

2.3.3 Steps in the Main Survey

The survey was conducted in two stages, involving two very different surveys: a **screening survey of managers** (to identify preliminary data on committees); and a **main questionnaire survey of committee members.**

The Screening Survey

The screening survey (see *Appendix C.1* for the actual questionnaire) was comprised of a four page booklet mailed to the manager of the workplace, which was followed up by a variety of mail and telephone reminders, to stimulate the hoped for 90% or greater response rate. The objective of this survey of management was: to determine that a committee existed; to identify the committee members (to allow the researchers to select management and worker contact persons); to obtain the information required to continue to the next stage (of surveying committee members); and to obtain a small amount of additional information on the committee and the workplace.

The Committee Member Survey

The committee member survey involved mailing of separate questionnaires to the "worker committee members" and "management committee members", using the information provided by the screening survey. This survey also involved extensive follow-up of: three mailings to managers, and four reminder mailings to workers plus telephone reminders.

Response Rates

The screening survey completion rate was computed as the percentage of the total number of workplaces or management contacts attempted which completed returns (93% of workplaces returned questionnaires). The JHSC members' survey completion rate was computed as the percentage which completed surveys were out of the total number of JHSCs attempted (74% of worker committee members returned questionnaires and 78% of management committee members returned questionnaires). (See *Appendix A* for details.)

Difficulty of Contacting Workers

Difficulty in contacting workers was a particular problem for the study. This was mostly a problem of many workers not being used to receiving mail at work, or not being allowed "non-emergency" phone calls. Also many companies are not used to processing mail for workers. Management attempts to obstruct the survey were a problem in only a very small percentage of firms, and when discovered were dealt with by follow-up mailings to workers at their home addresses, and by adding stickers to envelopes indicating "confidential".

Other problems which arose in the course of the survey were cases where individuals were ill, or where all of the committee members were new. When this occurred, each case was dealt with on an individual basis.

2.4 THE SURVEY QUESTIONNAIRES

Because the survey was designed to address many questions regarding the functioning of JHSCs (i.e. what makes them effective), the survey attempted to capture extensive detail on the structural form of JHSCs, what they actually do, perceptions of committee success, and information on the workplace in general.

2.4.1 The Screening Survey Questionnaire

The screening survey questionnaire was designed to obtain basic descriptive information about JHSCs and the workplace, and most importantly, to identify the contact persons who would later receive the committee member questionnaire. The screening questionnaire was directed at management, and information obtained in its main sections included:

1. Whether or not a JHSC existed with at least one worker and one management member, and how often the committee met.
2. Names of management and worker members, chairmanship, number of members from each side, and length of time on committee.
3. Age of committee, whether established voluntarily or by collective bargaining, sub-committee structure, and coverage of multiple workplaces.
4. Age of workplace, size of workforce and seasonal variations, existence of union or employee association, number of unions and percentage of employees unionized.

Overall, the screening survey obtained considerable information, and constituted a major survey regarding joint health and safety committees in and of itself. This was a major expansion of its role in the study, since the screening survey was originally conceived of only as a mechanism for identifying committee members. (See *Appendix C.1* for the actual screening questionnaire.)

2.4.2 Questionnaire for JHSC Members

General Content

Numerous important issues were addressed by the JHSC questionnaire, including: firm/ organization characteristics, committee structure and activities, attitudinal dimensions, perceived economic performance of (private sector) workplaces surveyed, labour relations environment, compliance with detailed provisions of the Act, and perceptions of committee success.

The committee member questionnaire was organized into Sections "A" to"Q", as is illustrated in Display 2.2 (next page).

Overall, the questionnaires reflected the model of the joint health and safety committee processes described in Section 1.3 (above).

DISPLAY 2.2

OVERVIEW OF QUESTIONNAIRE CONTENT

(Content varied between management and worker questionnaires, but most key sections were dealt with in both questionnaires)

A. JOINT HEALTH AND SAFETY COMMITTEE (JHSC) RESPONSIBILITIES AND STRUCTURE

B. JHSC (JOINT HEALTH AND SAFETY COMMITTEE) MEMBERS

C. EXPERIENCE, TRAINING AND ATTITUDES OF JHSC MEMBERS

D. JHSC MEETINGS IN THE PAST 12 MONTHS

E. JHSC MEMBER INSPECTIONS/INVESTIGATIONS, AVAILABILITY OF INFORMATION

F. DESIGNATED SUBSTANCES AND OTHER HAZARDS

G. JHSC RELATIONS, RECOMMENDATIONS AND REPORTS IN THE PAST 12 MONTHS

H. THE EMPLOYER (PRIVATE SECTOR FIRM OR PUBLIC SECTOR EMPLOYER)

I. EMPLOYEES/WORKFORCE DURING THE PAST 12 MONTHS

J. LABOUR RELATIONS

K. DANGER OF ACCIDENTS AND HAZARDS

L. MINISTRY OF LABOUR ROLE

M. IMPACT OF JHSC (JOINT HEALTH AND SAFETY COMMITTEE) ON HEALTH AND SAFETY

N. OVERALL EVALUATION

O. COMPLETION OF THE QUESTIONNAIRE

P. IF THERE IS A UNION

Q. IF THERE IS AN EMPLOYEE ASSOCIATION

Strategy for Matching Questions for Management and Worker Members

Because many dozens of issues were posed for the study, and because each issue has numerous facets, the total number of questions posed for the study numbered in the hundreds. In fact, in the pilot study, over 500 individual sub-questions and ratings were posed for management and worker members.

In the main study, need to limit the length of the study questionnaire led to many questions being asked only of workers or managers. Mainly this was a question of economy in the questionnaires, with emphasis given to: (1) matching (asking both) for high priority questions where both were expected to have the information; and (2) asking either workers or managers questions they would be most likely to be familiar with. In most cases, we can infer what "missing" responses for workers or managers might have looked like from our pilot study data (where, for example we asked workers and managers nearly all questions).

The actual questionnaires are provided in *Appendix C.2: Questionnaire for Management Members of Committees;* and *Appendix C.3: Questionnaire for Worker Members of Committees.*

Subjective Indicators

Strong reliance is placed on subjective indicators of impact/success in the analysis. This stance is taken for two reasons:

- First, reliable and objective data are not available for this type of analysis (reliability of Workmen's Compensation Board data, for example, is strongly affected by reporting variations and other problems, and also relates to a different definition of workplaces).
- Second, the assessments of the worker and management members surveyed reflects a significant storehouse of "front line" experience in dealing with health and safety matters on a day-to-day basis. For this reason (need for future objective research notwithstanding, as we note in Chapter 17), the study results and the subjective evaluations are seen as a highly important appraisal of the status of JHSCs and internal responsibility at this time.

2.5 RELIABILITY OF THE RESULTING DATA BASE

2.5.1 General Indicators of Reliability

Extensive tests were conducted to assess the reliability of the survey data. These included tests of reliability based on internal consistency, management-worker agreement, and agreement between survey data and information from the administrative files of the Ministry.

Internal consistency tests indicated that estimates of reliability (Cronbach's Alpha) were between .7 and .9 for most indicators -- suggesting good reliability.

Comparisons of management and worker data also indicated good levels of reliability for objective indicators. For example, management member reports on presence of a union in the workplace were correlated at (r = .96), a very strong correlation overall. Worker/manager reports of frequency of Ministry of Labour inspections were significantly correlated (r = .55); reports of Ministry orders issued (r = .46); worker/manager reports of frequency of JHSC inspections (r = .41); and worker-management member agreement on number of designated substances present (r = .53).* As well, satisfactory test-retest estimates of reliabilities were obtained for the sample participating in the pilot study.

These are regarded as indicating good reliability of the survey data overall, but worker and manager views are not synonymous on all issues, as is illustrated in various sections of this report.

Management and worker members' indicators of a more purely perceptional nature were not highly correlated, and their reports on some questions of fact differed in ways to suggest that managers and workers operate with very different information. As well, substantial differences seemed to appear in the ways in which worker and management members evaluate success of JHSCs (see Chapter 7).

Statistical confidence intervals: because of the large sample size studied, survey sampling errors are extremely low. Therefore, most statistical estimates of percentages will be accurate ±2%.

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*Good reliability was further indicated by tests to predict worker member responses from management member responses (and vice-versa), using discriminant analysis. Predictions were accurate 93% of the time for management and worker members' union/non-union status; accurate 75% of the time for reports on Ministry orders; accurate 71% of the time for frequency of JHSC inspections; and accurate 74.5% of the time for management and worker member reports on presence of designated substances.

2.5.2 Non-Response Bias: Not a Problem With This Data Set

Originally, non-response bias was seen as a potential obstacle to accurate survey results. Particularly, it was hypothesized that JHSCs which functioned poorly would be less likely to respond to the survey.

The extent of such response bias was assessed by correlating one indicator of non-response with such key indicators of JHSC performance as taking minutes, frequency of inspections, and overall evaluations of JHSC success (Display 2.3). These tests showed no correlations of r = .1 or greater. The results are regarded as indicating that the strong effort of the survey to achieve high response rates was sufficient to off-set non-response bias if this was a factor. Another factor which may explain this is that other sources of non-response were discovered, most importantly, institutional complexity of the workplace (large workplaces, especially those with several unions were also found to be slow to respond).

DISPLAY 2.3
CORRELATIONS OF NON-RESPONSE INDICATOR*
WITH SELECTED INDICATORS OF JHSC PERFORMANCE

JHSC Performance Indicators	Management Members	Worker Members	Variable Numbers
Taking regular minutes	**	-.06	M084/W084
Frequency of JHSC inspections	.03	.01	M101/W101
Overall evaluation of JHSC success	.02	.00	M292/W292

*Length of time needed to obtain a survey response was taken as the indicator of survey non-response (e.g. it is assumed that those who respond only after further contacts, or very late in the survey are "like" those who do not respond at all).
**Not asked for management members.

2.6 WEIGHTED STUDY RESULTS

All tables and statistics are presented showing weighted study results. This means that the tables show percentages as estimated to apply to the broader population of workplaces covered by the Act, and are intended to illustrate the Provincial situation for all workplaces, as suggested by these survey results.

2.7 HOW TO READ THE TABLES

Many of the tables are presented in condensed format, usually with "don't know" responses excluded. For example, a table in the report might show the following, as is shown below in Display 2.4. Numbers in the right margin identify variable numbers in the committee members' questionnaires (e.g. W274 references Variable #274 in the worker's questionnaire, the number "274" being one of a series of numbers located at the right of each question in the questionnaire).

DISPLAY 2.4

AN ILLUSTRATIVE TABLE*

	Management Members	Worker Members	
Do Ministry inspectors do the following? (% indicating "always" estimated with "don't know's" excluded)			W274/ M274
Review JHSC minutes	54.[illegible]%	42.0%*	

*This is actually a shorthand presentation of the data shown in Display 2.5.

Display 2.5 (below) shows the full detail "behind" the 42% indicated for worker members in Display 2.4. Truncation of the data and exclusion of "don't know's" allows a simpler and generally clearer illustration of response highlights.

DISPLAY 2.5

WORKER MEMBERS' RESPONSES IN DETAIL FOR DISPLAY 2.4

	Excluding "don't know's"	Including "don't know's"	# of** JHSCs	
Do Ministry inspectors do the following?				W274
Always	42.0%	30.1%	1,949	
Usually	23.2	16.7	1,079	
Sometimes	17.2	12.3	799	
Never	17.6	12.6	818	
Don't know	—	28.3	1,831	
Totals	100.0%	100.0%	6,477	

**Weighted N, for JHSCs reporting.

2.8 TERMINOLOGY

Certain terms are used in a particular way throughout the report:

- JHSC always refers to the joint health and safety committee. Sometimes we refer to JHSCs as committees, but this should be clear since no other type of committee is discussed in the report.
- Worker members: always refers to worker members of the JHSC.
- Management members: refers to management members of the JHSC.
- Management or management in general: refers to management outside of the JHSC.
- Workers or workers in general: refers to workers outside of the JHSC.

PART II:

THE CURRENT STATE OF JOINT HEALTH AND SAFETY COMMITTEES (JHSCs) IN ONTARIO

(IN WORKPLACES OF 20 OR MORE WORKERS, WHERE A JHSC
IS REQUIRED BY THE OCCUPATIONAL HEALTH AND SAFETY ACT)

3. PATTERNS OF JHSC ESTABLISHMENT

3.1 STATUS OF JHSCs (JOINT HEALTH AND SAFETY COMMITTEES) IN 1985

A primary concern of the study was to determine the extent to which committees had been established in compliance with the Act as of 1985 (the time of the survey).

Our tabulations (Display 3.1, next page) indicate that as of 1985, compliance with this provision of the Act was generally very good for workplaces with 20 or more workers. Committees were in operation in over 93% of such workplaces required to have them, with some 96.9% of all workers covered. Even so, a small minority of workplaces in every industrial sector were found not to have committees. These are especially likely to be the smaller and non-unionized workplaces. Larger and unionized workplaces tend to be much more compliant with the legislation.

This is seen as reflecting a variety of influences: (1) greater ease and incentive for compliance in large workplaces; (2) greater historical concern with health and safety committees in unionized workplaces and their past efforts to include such arrangements in contracts (see *Section 3.2*); and (3) greater Ministry attention to larger and unionized workplaces.*

3.2 HISTORICAL PATTERNS OF COMMITTEE ESTABLISHMENT

Historical patterns of committee establishment were examined to determine: (1) the extent to which committee establishment was a result of the 1978 Occupational Health & Safety Act; or (2) the extent to which JHSCs pre-dated the Act. This examination involved comparing year of JHSC establishment with such variables as: union/non-union status, presence of designated substances, size and industry sector. These indicators were all from the 1985 screener survey.**

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*While it may occur for various reasons, greater attention to larger and unionized workplaces through more frequent Ministry inspections is a reality of the current responsibility system, which is verified by regression analyses conducted by the study team.

**That is to say, the table does not derive from time series data for these variables.

DISPLAY 3.1
JOINT HEALTH AND SAFETY COMMITTEES (JHSC'S)
IN ONTARIO, IN WORKPLACES OF 20 OR MORE WORKERS, WHERE A JHSC
IS REQUIRED BY THE OCCUPATIONAL HEALTH AND SAFETY ACT*

	SIZE OF WORKPLACE			
Type of Workplace	20-74 Workers	75-249 Workers	250-499 Workers	Over 500 Workers
Non-Unionized Workplaces With No Designated Substances (% with committees)	86.3%	91.4%	92.1%	90.9%
Unionized Workplaces With No Designated Substances (% with committees)	92.5%	98.2%	99.5%	100.0%
Non-Unionized Workplaces With Designated Substances (% with committees)	92.4%	96.4%	96.9%	100.0%
Unionized Workplaces With Designated Substances (% with committees)	97.5%	100.0%	99.5%	100.0%

Total for all workplaces = 93.2%

*Data from screening survey. Note that status of workplace re: size, unions, presence of designated substances is always estimated from 1985 status.

3.2.1 General Patterns

As can be seen in Display 3.2 (next page), joint health and safety committees were already in place in a substantial minority of workplaces by 1978, when the Act was passed (37.4%), and committees were established in 49.5% of workplaces in 1979, when the Act came into effect.

The display also shows the growth in JHSCs during the 1970's when concerns with health and safety were growing, and before and after 1976 (passage of the Employee Health & Safety Act). As can be seen in Display 3.2, it was primarily the unionized and larger workplaces which had committees prior to 1978, and the non-unionized sector and smaller workplaces which were most influenced by the 1978 Act's requirement that joint committees be established.

DISPLAY 3.2

HISTORICAL PATTERN OF COMMITTEE ESTABLISHMENT*

% of workplaces with JHSC's by year of establishment of JHSC	PERCENTAGE OF WORKPLACES WITH COMMITTEES Pre-1970	1971 to 1976	1977	1978	1979	1980	1981	1982	1983	1984
	%	%	%	%	%	%	%	%	%	%
All workplaces with 20 or more workers	9.2	25.8	29.7	37.4	49.5	65.3	74.6	81.3	88.0	92.9
Workplaces by Union/ Non-Union Status										
Non-Unionized	4.2	13.9	16.7	21.8	33.4	51.8	64.0	73.8	81.8	88.4
Unionized	12.7	34.0	38.7	48.2	60.7	74.7	82.0	86.5	92.3	96.0
Workplaces by Presence of Designated Substances										
Not present	7.1	22.1	25.8	33.1	45.7	62.6	71.8	79.0	86.2	91.6
Present	16.5	38.7	43.1	52.2	62.8	74.8	84.4	89.1	94.1	97.6
Workplaces by Size										
20 to 74 workers	5.1	18.3	20.9	28.3	40.3	56.7	67.9	75.3	83.0	90.1
75 to 249 workers	13.4	32.0	38.3	46.2	57.6	74.9	82.2	88.5	94.3	96.4
250 to 499 workers	17.7	44.6	51.2	58.8	73.0	82.4	88.7	91.3	95.8	97.9
Over 500 workers	21.0	52.6	54.5	64.1	79.1	87.6	90.2	96.2	98.2	98.9

*Data from screening survey. Note that status of workplace re: size, unions, presence of designated substances is always estimated from 1985 status.

3.2.2 Committee Establishment by Industry Sector

It was decided to examine the potential effects of industry type on the functioning of JHSCs. A sampling plan was developed with a breakdown of workplaces into the SIC (Standard Industrial Classifications) groupings shown in Display 3.3 (next page).

In Display 3.3, it can be seen that the establishment of JHSCs has occurred at somewhat different rates among the various industry sectors examined, with industries such as mining, rubber, paper and chemicals, which are characterized by large unionized workforces, leading the way prior to the legislation and to the present time. Committee establishment by industry type at the present time shows relatively small differences among the sectors, but still reflects the trend towards greater compliance by certain industries.

DISPLAY 3.3

HISTORICAL PATTERN OF COMMITTEE ESTABLISHMENT BY INDUSTRY SECTOR*

	PERCENTAGE OF WORKPLACES WITH COMMITTEES									
% of workplaces with JHSC's by year of establishment of JHSC	Pre-1970	1971 to 1976	1977	1978	1979	1980	1981	1982	1983	1984
	%	%	%	%	%	%	%	%	%	%
MINES, QUARRIES, OIL WELLS	15.0	47.8	51.0	61.0	64.7	70.9	77.9	77.9	85.6	91.2
MANUFACTURING										
Food and Beverage	5.4	21.7	24.7	33.0	43.4	56.1	67.4	76.0	85.0	88.8
Rubber	13.4	36.3	42.2	54.9	77.1	82.0	89.6	89.6	97.1	100.0
Leather	4.6	10.7	15.1	27.1	37.3	49.5	57.5	77.7	81.5	81.5
Textiles	6.2	19.7	29.1	32.6	39.1	49.4	63.9	68.1	82.4	89.2
Wood/Furniture Fixtures	12.4	23.1	23.4	32.1	38.6	57.9	74.2	78.6	86.5	88.3
Paper and Allied	9.4	30.2	37.8	47.0	66.4	74.0	82.8	93.5	100.0	100.0
Printing, Publishing & Allied	3.2	6.5	11.7	17.6	29.3	58.8	68.9	78.0	79.3	91.8
Primary Metal and Fabricating	13.7	26.9	29.7	38.4	51.7	68.6	74.6	79.1	87.0	95.6
Machinery & Transportation Equipment	19.1	42.6	48.0	57.8	68.9	74.8	80.8	87.8	95.1	97.1
Electrical Products	11.0	26.6	31.4	38.0	48.7	62.3	71.1	79.7	90.2	91.8
Non-Metallic Mineral Products	23.4	33.3	41.1	52.0	65.4	71.3	80.8	83.6	87.9	96.6
Chemical and Petroleum	15.8	41.3	47.5	59.1	74.8	78.8	87.4	94.2	98.1	99.5
Miscellaneous Manufacturing	.9	9.0	10.5	21.4	31.5	45.3	56.2	64.6	77.1	91.3
TRANSPORTATION & COMMUNICATIONS	7.1	9.3	9.3	20.2	39.0	75.0	78.7	86.4	94.6	95.0
WHOLESALE TRADE	6.6	29.7	33.3	36.5	45.3	63.1	70.0	82.8	86.4	88.3
FINANCE, INSURANCE, REAL ESTATE	3.3	6.6	8.0	11.3	23.3	40.2	63.1	67.9	79.9	89.0
EDUCATION	6.9	46.7	47.7	50.5	56.8	65.7	68.6	77.9	81.1	95.7
HEALTH AND WELFARE	9.4	27.3	30.5	41.1	56.4	75.5	85.2	89.3	92.8	94.7
PUBLIC ADMINISTRATION	2.0	14.8	25.5	29.7	42.7	69.1	69.1	88.2	92.1	92.9
OTHER SECTORS	4.3	27.4	33.9	33.9	61.3	65.3	70.6	78.3	83.6	89.2

*Data from screening survey. Note that status of workplace re: size, unions, presence of designated substances is always estimated from 1985 status.

3.3 RELATION OF JHSCS TO STRUCTURE OF WORKPLACE

One question posed in our attempt to describe workplaces was: What is the extent to which JHSCs serve complex workplaces -- workplaces with a number of separate divisions, or separate buildings or areas, or even physically separate locations?

Specifically, the question was posed as to whether workers from all departments, shifts, etc. would be directly represented on JHSCs for such "complex" workplaces.

3.3.1 JHSCS Serve Many Complex Workplaces

A substantial number of JHSCs are found to serve complex workplaces involving either: more than one major building or area; more than one major department or division; or more than one physically separate location. Although school boards accounted for many of the JHSCs with separate locations, we also found many instances of a single JHSC serving industrial plants located some distance apart.

The "complex workplace" category tends to include many of Ontario's very large workplaces (e.g. large industrial plants, large institutions such as hospitals). As can be seen in Display 3.4, such complex committee structures are found for 30% to 61% of workplaces. Such complexity is seen as presenting a special challenge to the establishment and functioning of JHSCs.

3.3.2 Patterns of Representation

Our hypothesis was that the extent of representation might vary, and that this could be an important feature of the functioning of JHSCs (since the JHSC is conceptualized as part of a broader internal responsibility system which includes cooperative problem-solving by management and workers generally, and which requires effective communication by all parties).

Our analysis (Display 3.5, next page) indicates that JHSCs in complex workplaces vary considerably in the extent to which they directly represent sub-units of the workplace.

Generally, coverage of complex workplaces tends to be good, with "all" or "most" sub-units being represented for the vast majority of complex workplaces. But representation was found to be partial in more than 20% of workplaces.

DISPLAY 3.4
JHSC STRUCTURES IN COMPLEX WORKPLACES

Survey Question/Choices	Management Members	Worker Members	
			M016
Does the JHSC serve more than one major building or area?			
Yes	37.8%	*	
No	62.2		
			M018
Does the JHSC serve more than one major department or division?			
Yes	61.6%	*	
No	38.4		
			M020
Does the JHSC serve more than one physically separate location?			
Yes	30.3%	*	
No	69.7		

* Not asked for worker members.

DISPLAY 3.5
JHSC REPRESENTATION IN COMPLEX WORKPLACES

Survey Question/Choices	Reports by Management Members	Reports by Worker Members	
			M017
Are there JHSC members representing all major buildings or areas?			
One Building/Area Only	62.2%		
Several Buildings/Areas			
All are represented	25.5	*	
Most are represented	10.4		
Only a few are represented	1.9		
			M019
Are there JHSC members representing all major departments or divisions?			
One Department/Division Only	38.4%		
Several Departments/Divisions			
All are represented	39.6	*	
Most are represented	17.9		
Only a few are represented	4.0		
			M021
Are there JHSC members representing all separate locations?			
One Location Only	69.7%		
Several Locations			
All are represented	21.3%	*	
Most are represented	6.9		
Only a few are represented	2.2		

* Not asked for worker members.

3.4 THE WORKPLACE AS THE SETTING FOR HEALTH AND SAFETY ACTION

3.4.1 Type of Ownership/Scope of Operations

Workplaces required to have JHSCs include many different types of operations including many organizations which are not private sector firms. That JHSCs operate in a wide range of workplace types, is shown in Display 3.6. It can be seen that most workplaces are private sector companies, but that there are significant numbers of non-profit organizations (8.1%), Crown corporations (6.0%), and government agencies (10.1%).

The survey results also indicate that the workplaces vary considerably in terms of their relationship to larger organizations. Most workplaces are found to be part of larger operations, either Ontario-wide (17.9%), Canada-wide (13.2%), or international in scope (34.3%). Only 34.5% of workplaces are found to be "lone" operations. (See Section 3.3 above, for a discussion of patterns of complexity of the workplace itself.)

DISPLAY 3.6
ORGANIZATIONAL CHARACTERISTICS OF THE WORKPLACE

Survey Question/Choices	Management Members	Worker Members	
			M212
Which of the following best describes the employer?			
A private sector company	75.9%	*	
A non-profit organization	8.1		
A public (crown) corporation	6.0		
A government agency	10.1		
			M213
Please indicate if this workplace is:			
The only operation of the corporation/firm	34.5	*	
Part of operations across Ontario	17.9		
Part of operations across Canada	13.2		
Part of operations in Canada and other countries	34.3		

* Not asked for worker members.

3.4.2 Health and Safety Programs

Workplaces also differ significantly in the provision and scope of health and safety programs. Management members of JHSCs report that in 84.4% of workplaces, the employer has a health and safety program in place (Display 3.7), and these display a variety of characteristics. Overall, worker assessments were very similar, with 81.1% reporting existence of health and safety programs and policies.

The most prominent features of health and safety programs were workplace inspections (75.5%), and reporting and investigation of accidents (75.1%). Least common (of the elements asked about) were safety/health performance appraisals for managers (23.9%).

DISPLAY 3.7
HEALTH AND SAFETY PROGRAMS

Survey Question/Choices	Management Members	Worker Members	
Does the employer have a health and safety policy or program?			M222/ W222
Yes	84.4%	81.1%	
No	15.6	18.9	
Does the policy/program include: (% indicating "yes")			M223/ M231
Health and safety department or staff	52.1%	*	
Formal training	41.5		
System for employee input	52.8		
Workplace inspections	75.5		
Written job/safety practices/procedures	56.2		
Reporting and investigation of accidents	75.1		
Information on toxic substances and physical hazards control	53.0		
Safety/health performance appraisal for managers	23.9		
Emergency procedures	59.5		

*Not asked for worker members.

3.4.3 Concern for and Understanding of Health and Safety in the Workplace

Workplaces are also reported to vary greatly in the quality of knowledge and concern regarding health and safety, and contributions to the JHSC (e.g. identifying hazards, providing information) on the part of management in general (Display 3.8, next page), and on the part of workers in general (Display 3.9).

Most JHSC members report good understanding and concern for health and safety, and good contributions to the JHSC by management and workers generally. But many JHSC members report poor attitudes towards health and safety, and management and worker members alike agree that concern and understanding of workers is less than adequate in about 20% to 30% of workplaces.

Overall, worker understanding and concern for health and safety is generally rated as lower than that of management, by both management members and worker JHSC members. Worker knowledge of the Occupational Health and Safety Act in particular is rated poorly. More than 40% of management and worker members of JHSCs indicate that worker understanding of the Act is generally poor or less than adequate.

DISPLAY 3.8
HEALTH AND SAFETY ATTITUDES OF MANAGEMENT IN GENERAL

Survey Question/Choices	Management Members	Worker Members	
Please assess each of the following as regards management in general (not just members of your JHSC):			M218 TO M221
(a) general knowledge of Occupational Health and Safety Act and regulations			
Less than adequate to poor	13.0%	25.1%	
Adequate	43.5	36.6	
More than adequate to excellent	43.6	38.2	
(b) understanding of and concern for safety hazards in this type of workplace			
Less than adequate to poor	5.1	19.3	
Adequate	23.4	27.7	
More than adequate to excellent	71.5	53.1	
(c) understanding of and concern for health hazards in this type of workplace			
Less than adequate to poor	7.1	20.2	
Adequate	22.5	28.1	
More than adequate to excellent	70.4	51.7	
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)			
Less than adequate to poor	11.9	26.0	
Adequate	26.2	27.5	
More than adequate to excellent	61.9	46.6	

DISPLAY 3.9
HEALTH AND SAFETY ATTITUDES OF WORKERS IN GENERAL

Survey Question/Choices	Management Members	Worker Members	
Please assess each of the following as regards workers in general (not just members of your JHSC):			M242 TO M245
(a) general knowledge of Occupational Health and Safety Act and regulations			
Less than adequate to poor	40.4%	45.4%	
Adequate	40.8	38.0	
More than adequate to excellent	18.8	16.6	
(b) understanding of and concern for safety hazards in this type of workplace			
Less than adequate to poor	18.2	27.3	
Adequate	37.8	36.4	
More than adequate to excellent	44.0	36.3	
(c) understanding of and concern for health hazards in this type of workplace			
Less than adequate to poor	20.0	26.0	
Adequate	36.0	37.2	
More than adequate to excellent	44.1	36.8	
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)			
Less than adequate to poor	26.1	28.2	
Adequate	28.9	29.4	
More than adequate to excellent	45.0	42.5	

4. CHARACTERISTICS AND FUNCTIONS OF JHSCS

4.1 COMPOSITION OF JHSCS, CHARACTERISTICS OF MEMBERS, TRAINING

To provide a better understanding of the workings of JHSCs, a number of committee characteristics were examined. These included characteristics of JHSC members and training of members. We expected to find a diversity of committee characteristics, but were uncertain as to details: for example whether committees would be formed in the manner required by the Act, and whether members would have extensive or limited training.

4.1.1 JHSC Membership

Types of JHSC Members

One question posed at the start of the study was whether or not senior management are significantly involved in JHSCs. Concern for senior management involvement was based on previous studies, which suggested that the level of management support, and involvement by senior management are success factors for JHSCs.*

Our results (Display 4.1, to follow) indicate a relatively high level of involvement by senior management. In just over 50% of JHSCs, senior management are members. In over 70%, middle-level management and supervisors are members. As well, JHSCs have a range of other types of members: 27.7% have health and safety directors as members; 15.4% of JHSCs have staff (doctors and nurses) as members;** and industrial relations staff are members of 17.7% of JHSCs.

The researchers posed the same question for union officers in unionized workplaces. Although previous studies had not examined this question, it was hypothesized that the presence of senior union officers might also be a factor affecting success, and so we examined this aspect of membership as well.

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*See: Alberta Department of Labour, *Occupational Health & Safety. An Initial Review of the Joint Work Site Health and Safety Committee Program in Alberta.* 1979, page 78 and 83; Beaumont et al, *The Determinants of Effective Joint Health and Safety Committees.* 1982, page 13; Kochan, *The Effectiveness of Union-Management Safety and Health Committees.* 1978, page 53.

**Some disagreement was noted in the study as to actual status of these technical persons. In some workplaces these were identified as management committee members. In other workplaces, they were identified as resource persons. Sometimes health and safety professionals and management disagreed on the respective roles of these persons.

(It could be argued, paralleling the argument regarding senior management, that presence of union officers would also be a facilitator of work of the JHSC. Burkett,* however, argues that presence of union officers or others involved in collective bargaining will have negative effects. This hypothesis is examined later in the report.)

Survey results indicate a strong presence of union officers on JHSCs. Worker JHSC members in unionized workplaces report that just over half (51%) have officers of the local union executive on the JHSC, and just under half have JHSC members who hold other union positions.

Selection of Worker Members: A Major Issue

Selection of worker members of the JHSC was seen to be a matter of concern on two grounds: (1) legally, the Act calls for selection of worker members to JHSCs by workers or their union; and (2) sociologically, the representational role can be seen as important for effective functioning of internal responsibility (e.g. for the worker members to play an effective role in linking workers into the joint problem-solving process).

Our findings suggest that, contrary to the requirements of the Act, many worker members are selected for JHSCs by management (35.2% in total): 19% are reported to be appointed directly by management, while in another 16.2% of cases, management is reported to accept worker volunteers.

This appears to represent a major problem for JHSCs, and for the Ministry, on several grounds:

1. An important provision of the Act is not being complied with in a significant percentage of Ontario workplaces.
2. Such a process does not enhance worker linkages to the JHSC, and thus undermines the potential of the internal responsibility system.
3. Worker members chosen by management may, in an unknown number of cases, be unable to represent workers' interests effectively because their method of appointment may result in some degree of control by management.

This is an important finding which deserves additional comment (and possibly further investigation).

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*Kevin M. Burkett and others, *Towards Safe Production. The Report of the Joint Federal-Provincial Inquiry Commission into Safety in Mines and Mining Plants in Ontario*, April, 1981.

DISPLAY 4.1
JHSC MEMBERSHIP PATTERNS

Survey Question/Choices	Management Members	Worker Members	
What types of management staff are on your JHSC at this time? (% indicating "yes")			M026 TO M030
Senior managers(s)	50.3%	*	
Middle level managers/supervisors	73.7		
Safety Director	27.7		
Doctor, nurse	15.4		
Industrial relations specialist or personnel manager	17.7		
Do any worker members hold: (% indicating "yes" for each type of position)**			
A position on local union executive	***	51.0%	
A position on negotiating committee		43.5	
Any other elected or appointed union position		47.0	
How are worker members selected?			W032
Appointed by management	***	19.0%	
Management acceptance of volunteers		16.2	
Appointed by union executive		18.1	
Appointed by employee association executive		2.3	
Chosen by workers at election		31.7	
Accepted by workers at a meeting where volunteers come forward		12.7	

* Not asked for worker members.

**This sub-table only applies to a population of more than 5,500 workplaces with unions.

***Not asked for management members.

Discussion

A key question to consider is why are managers appointing worker members? Several factors could account for this type of procedure:

- o First, and probably most importantly it is likely that many managers do not clearly understand these provisions of the Act. For these persons, appointing worker members may be seen as the simplest method of satisfying the initial requirements of the Act -- that management organize a JHSC.

- o Second, it seems likely that in many workplaces workers themselves may not be very interested in health and safety, or (in non-unionized workplaces) they may simply have no structure to supervise selection of representatives to a JHSC. (The reality of poor attitudes regarding health and safety matters among workers in general, was examined in Section 3.4.) Indeed, management also appoints members even in some unionized workplaces, suggesting that additional union involvement is needed in this area.

- o Third, it is possible that at least a small percentage of employers engaging in this practice are willfully obstructing the Act.

Regardless of the weight of these different explanations, the result suggests an important weakness in the joint health and safety committee system in Ontario. Worker members of JHSCs must be selected by the workforce if they are to effectively represent workers, and for internal responsibility to work. This issue is discussed in further detail in Chapters 10 and 16, where study conclusions are outlined.

4.1.2 Training of Members

Our review of literature in the health and safety field, and consultation with health and safety practitioners, led us to examine training of JHSC members as one key feature of committee functioning. We anticipated that training would be widespread for JHSC members, but that many important gaps in training would occur.

Lack of Training For JHSC Members Appears to be a Major Problem

Overall, the survey results indicate that training is far less than might be desirable, and that important gaps exist in training, especially for worker members (see Display 4.2, next page). Some key gaps noted are: (1) overall, a low level of training on the Occupational Health and Safety Act itself (only 59% of management and 37% of worker members report receiving this type of training); and (2) little training on assessment and control programs for designated substances (only 22.5% of managers and 13.4% of workers). As well, only 26.7% of management members report receiving any training in problem-solving, and only 16.1% of worker members report having any training in problem-solving.

A more general problem noted is the **lack of any health and safety training whatsoever, for 19% of management members of JHSCs and the lack of any training at all for 39% of worker members of JHSCs.** The significance of lack of training for worker members is underlined by noteworthy differences between the amount of training received by workers and managers in all areas of training examined. In every area workers are less likely to have had training.

DISPLAY 4.2
TRAINING OF JHSC MEMBERS

Survey Question/Choices	Management* Members	Worker** Members	
What types of formal training have been provided to JHSC members? (% indicating each type of training)			M042 TO M049
Training on Occupational Health & Safety Act	59.5%	36.9%	W051 TO W058
Accident prevention, causation, investigation	58.1	33.4	
Hazard recognition	48.5	34.7	
Industrial hygiene	21.2	15.0	
Assessment and control programs for designated substances	22.5	13.4	
Inspections	44.0	36.2	
Problem-solving techniques	26.7	16.1	
MANAGEMENT MEMBERS HAVE HAD NO SUCH TRAINING	19.4	****	
WORKER MEMBERS HAVE HAD NO SUCH TRAINING	***	38.8	
Percentage of management (or worker) members that have had the following amounts of health and safety training under any program? (% indicating "yes")			M034 TO M036
	(NOT INTENDED TO ADD TO 100%)		
A 1 to 2 day seminar/course (6 to 16 hours)	54.0%	43.0%	W038 TO W040
A course of 3 - 4 days (17 to 29 hours)	22.0	12.6	
A course of more than 4 days (over 29 hours)	19.0	14.0	

*Reporting on training received by management members of the JHSC.

**Reporting on training received by worker members of the JHSC.

***Not asked for management members.

****Not asked for worker members.

4.2 ORGANIZATION AND PROCEDURE

Several aspects of JHSC organization were examined, among these: (1) the organization of positions or offices within committees, particularly positions of chairpersons and co-chairpersons; (2) use of sub-committees (particularly in complex workplaces); and (3) documentation (taking minutes, etc.).

4.2.1 Chairpersons/Co-Chairpersons

As can be seen in Display 4.3 (next page), most JHSCs have a single chairperson (60.8%). This chairperson is usually appointed by management (62.5%) and tends to be a management member about 72.6% of the time (workers in 51.5% of these JHSCs indicate that the chairperson is "always from management", compared to 6.3% "always a worker". Some 42.3% of committees have a rotating or elected chair.

Actual authority of the chairperson is reported to be somewhat more diffuse, but still strong. Chairpersons seem to have exclusive power to call meetings in about half of JHSCs, and complete control of agenda and minutes in 25% to 35% of committees.

That the chairperson has a number of procedural prerogatives and is usually from management, is a significant feature of Ontario JHSCs.

Discussion

The Act reinforces the preeminence of management in JHSCs, by placing certain responsibilities on management and not on workers. This may account in part for management's tendency to control the chair of JHSCs, but this element of control may be a problem for JHSCs.

As we will note below, increasing participation and interest of workers in committees, and increasing information, and knowledge of health and safety of workers in general, are important concerns of internal responsibility which may be negatively affected by uneven distribution of influence in JHSCs.

DISPLAY 4.3
COMMITTEE POSITIONS

Survey Question/Choices	Management Members	Worker Members	
Is there a chairman or co-chairmen?			W076
One chairman	*	60.8%	
Management/worker co-chairmen		19.3	
No formal chairman or co-chairmen		19.9	
How is the chairman selected?			W077
Vote of JHSC	*	25.3%	
Rotates between management and worker members		9.8	
Appointed by management		62.5	
Appointed by union		2.5	
Is the chairman always from management?			W078
Always from management	*	51.5%	
Always from workers		6.3	
Can be from workers or management		42.3	
Who can call JHSC meetings? (% indicating "yes")			W070 TO W072/ M070 TO M072
Chairman or co-chairmen only	53.8%	49.2%	
Any management member	56.8	50.4	
Any worker member	55.3	42.4	
Who usually determines what will be on the agenda for meetings? (% indicating "yes")			W080 TO W082/ M080 TO M082
Chairman/co-chairmen only	34.0%	24.8%	
Any management member can suggest items	78.1	66.9	
Any worker member can suggest items	85.5	83.4	
Who usually approves the final draft of minutes?			W087/ M087
Chairman/co-chairmen only	28.7%	22.8%	
A management member	8.1	14.3	
A worker member	1.6	4.4	
At least 1 management and 1 worker member	17.2	14.1	
Entire JHSC	28.1	24.8	
There is no approval process	13.7	13.8	

*Not asked for management members.

4.2.2 Sub-Committees

Use of sub-committees was examined to determine in particular, the extent to which JHSCs in complex workplaces use this strategy to respond to complexity.

As can be seen in Display 4.4, sub-committees are widely used in larger and more complex workplaces. Very large workplaces in particular (over 500 workers) are especially likely to establish sub-committees, with 30.4% having sub-committees established.

DISPLAY 4.4
SUB-COMMITTEES*

Survey Question/Choices	Management Members	Worker Members	
Workplaces by size and presence of sub-committees (% indicating JHSC has sub-committees)			W083 TO W086
Size			
20 - 74	3.1%	**	
74 - 249	8.7		
250 - 499	12.2		
Over 500	30.4		
Workplaces by complexity and presence of sub-committees (% indicating JHSC has sub-committees)			M016*
Only 1 building or area	4.3*	**	
Several major buildings or areas	9.9		
Only 1 major department/division	3.5	**	M018*
Several departments/divisions	8.0		
Only 1 location	4.5	**	M020*
Several physically separate locations	10.7		

* Data on sub-committees from screener survey.

**Questions on workplace complexity not asked for worker members.

4.2.3 Documentation and Formal Procedures

Documentation within JHSCs was examined as both an indicator of institutional operation, and (where minutes are concerned) compliance with the Act. Aspects of documentation examined included: keeping written minutes, use of written agendas, and other items.

JHSCs apparently place great emphasis on the taking of written minutes, as is required by the Act (81.5% of members indicated that minutes are "always" taken). Yet 18.5% of committees are not in full compliance with this feature of the Act.

Other items examined show considerable variation in emphasis on documentation and formal procedures. For example, less than half of JHSCs are reported to use a written agenda for meetings, or to attach action plans to recommendations.

DISPLAY 4.5
DOCUMENTATION/PROCEDURE

Survey Question/Choices	Management Members	Worker Members	
How often does the JHSC: (% indicating "always")			W083 TO W086
Have a written agenda for meetings?	*	48.6%	
Take written minutes of meetings?		81.5	
Attach action plans to recommendations?		46.3	
Set dates for implementing recommendations?		30.3	

*Not asked for management members.

4.3 ASPECTS OF JHSC INSTITUTIONALIZATION: SCOPE OF FUNCTIONS, MEETINGS, INSPECTIONS AND INVESTIGATIONS

Several aspects of JHSC activity were examined to determine the extent to which committees have institutionalized basic functions suggested by the literature, and certain functions suggested by the Act. These aspects of JHSCs include the scope of activities, meetings, and inspections.

4.3.1 Overall Functions

Scope of JHSC Activity

JHSCs vary greatly in functions undertaken (see Display 4.6, next page). Nearly all JHSCs indicate that they engage in inspection of the workplace (95% management, 91% workers), but a wide range of other committee functions are also reported.

Members report that a majority of JHSCs engage in other key activities such as accompanying Ministry of Labour inspectors, reviewing Ministry inspection reports, investigating accidents, and investigating work refusals. But these numbers fall below what might be expected for a number of functions which are suggested by the Act. For these, 100% participation might be expected as compliance with the Act. For example, only 80% to 90% of members regard accompanying Ministry inspectors as a duty; and only 50% to 62% of members regard investigations of work refusals as a responsibility of the JHSC. This is seen as suggestive of certain problems in JHSC compliance with the Act, which are addressed in detail in Chapter 8.

Equally important to the lack of activity by some JHSCs is the finding that many JHSCs pursue functions going beyond the Act which are seen as contributing to JHSC effectiveness. For example, many JHSCs report involvement in the review of company health and safety programs, and in the broader provision of training to managers and workers alike.

JHSCs' Decision-Making Role: Perceptions of Members

Similarly, a substantial percentage of JHSCs (41% according to managers, and 35% according to workers), are regarded by their members as decision-making bodies, and not merely advisory, as is prescribed by the Act. Later, in Part III of this report, dealing with factors contributing to effectiveness of committees, we will examine these factors (actual scope of the JHSCs' activity, and role as a decision-making body) as possible contributors to success.

DISPLAY 4.6
SCOPE OF COMMITTEE ACTIVITIES

Survey Question/Choices	Management Members	Worker Members	
Which of the following are regarded by your Joint Health and Safety Committee (JHSC) as its duties or responsibilities? (% indicating "yes")			M001 TO M013/ W001 TO W013
Inspect workplace	95.4%	91.2%	
Accompany Ministry inspectors	88.9	79.6	
Review Ministry inspection reports	85.9	74.9	
Review new technology/processes/substances	39.0	30.8	
Review designated substances' assessment/ control programs	47.8	37.0	
Review company health and safety programs/policies	80.3	66.8	
Get information on practices in similar workplaces	42.7	37.5	
Get information on existing workplace hazards	74.6	63.2	
Investigate work refusals	62.4	50.6	
Investigate accidents	83.1	72.0	
Develop educational/training programs for workers	45.4	36.5	
Develop educational/training programs for management	31.0	18.7	
Monitor health and safety practices of contractors	32.8	24.7	
Overall, is your JHSC regarded by your members as: (% indicating "yes")			M022 TO M024/ W022 TO W024
A decision-making body	41.1%	35.0%	
An advisory body	72.2	64.9	
An information sharing body	56.9	62.4	

Discussion

Although managers and workers tend to give somewhat similar responses to most questions asked in the survey, a substantial number of issues were examined in the study in which management and worker members report very different assessments of JHSC activities and impacts. The results in Display 4.6 (previous page) exemplify the difference between management and worker responses, particularly for items such as reviewing company health and safety programs/ policies and developing educational/training programs for management.

Management-worker disagreement is not surprising where evaluations are made, or where attitudes are surveyed. But where matters of fact are in question it becomes more puzzling. Generally, our survey results indicate an overall tendency towards agreement of management and worker reports on typical factual matters (see Chapter 2). Yet on some key items which are factual, their answers differ greatly.

Our assessment is that this type of result indicates that in many cases, management and workers have different ways of looking at the issue, or even different facts at hand. As we will note at several points, this raises questions about the depth of cooperation and the quality of communication and information sharing on committees.

An alternative hypothesis, which applies to questions of compliance with the Act or general performance is that some managers may give slightly exaggerated assessments of competence, scope, or impact of committees. That some managers might do this is consistent with social psychological studies of perception, and with the fact that managers in JHSCs are more likely to have direct responsibility for success of committees as part of their job.

4.3.2 JHSC Meetings

Regular meetings are required by the Act, and are a central element in the functioning of JHSCs. Accordingly, several aspects of committee meetings were examined.

Reports on meetings suggest that most JHSCs meet regularly and frequently. As well, most JHSC members report that additional meetings are called when needed (Display 4.7, next page).

Most JHSCs are reported to meet 4 to 12 times per year with an average of 7.25 meetings annually. Even so, a substantial minority of JHSCs were found to meet infrequently, and less often than called for by the Act: 16.7% of JHSCs meet 3 times or less per year. The reported average length of JHSC meetings is 71 minutes.*

DISPLAY 4.7

JHSC MEETINGS: FREQUENCY AND PROCESS

Survey Question/Choices	Management Members	Worker Members	
Are meetings regularly scheduled (e.g. monthly, quarterly, etc.)?			M073/ W073
Yes	90.8%	80.6%	
No	9.2	19.4	
Are additional meetings called when needed?			M074/ W074
Yes	91.1%	75.1%	
No	8.9	24.9	
How many times has your JHSC met in the past 12 months?			W069
Less than 4 times a year	*	16.7%	
4 to 6 times a year		41.2	
6 to 12 times a year		39.6	
More than 12 times a year		2.5	

*Not asked for management members.

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*Total amount of time on JHSC business in a month, including meetings, was highly variable, since many members spend an hour or less a month at one extreme (18% of management members and 26% of worker members). At the other extreme, in the largest workplaces many management members and even a large number of worker members of JHSCs work full-time on committee business. The median amount of time spent on JHSC business was 4 hours per month for management members and 2.8 hours per month for worker members of JHSCs.

4.3.3 Inspections of the Workplace

Workplace inspection is regarded as a central element of JHSC functioning, since inspections provide a main source of information on health and safety hazards. Ham (1976) in particular, stressed the importance of inspections in the internal responsibility system. Because of the central role of inspections in JHSC scope of responsibilities (Display 4.6, above), we expected inspections to be an area of intensive activity. Accordingly, several aspects of inspections were examined.

Frequency of Inspections

Workplace inspection is specified by the 1978 Act as a function of the worker members of the JHSC, but no minimum number of inspections is specified by the Act. In fact, the Act takes the opposite approach of specifying a maximum frequency of "not more than once a month".

Our analysis found wide variation in frequency of JHSC worker member inspections, with overall worker and management estimates being very similar: (1) About 10% of committees report that they exceed the limit of the Act, conducting inspections more often than once a month; (2) About 46% of JHSCs report monthly inspections, while about 34% report inspections every 2 to 12 months; and (3) About 10% report that they never conduct inspections.

The Inspection Process

JHSC members also report considerable variation in the inspection process: who is involved in inspections, how inspections are done, and inspection reports. For example:

- Other persons were found to accompany JHSC worker members on their inspections. In particular, management members of the JHSC accompany worker inspectors slightly more than half of the time (51.0% of JHSCs).

- Inspections are reported to be guided by a detailed procedure or plan in just over half of workplaces (51.8% of JHSCs).

- Reports on worker inspections appear to be more available to management than to workers. Inspection reports are provided to 69% to 76.1% of management members of JHSCs, as compared to 52.1% to 58.9% of worker members. Interestingly, 5.5% to 9.1% of JHSCs report that they provide no inspection reports to anyone.

DISPLAY 4.8
JHSC INSPECTIONS: FREQUENCY, PROCESS AND EVALUATION

Survey Question/Choices	Management Members	Worker Members	
How often does a worker member of your JHSC undertake health and safety inspections of the workplace?			M101/ W101
Once a week/or more often	9.2%	10.5%	
Once a month	48.3	44.4	
Once every two months	9.4	7.8	
Once every three months	17.6	17.1	
Once every six months	5.8	5.2	
Once every twelve months	2.4	3.9	
Never	7.2	11.1	
Do any of the following usually accompany the worker JHSC member(s) on inspections? (% indicating "yes")			W102/ W106
Management members of JHSC	*	51.0%	
Union staff		9.3	
Other workers		18.8	
Other managers/supervisors		21.7	
No other persons		19.0	
Is the inspection guided by a procedure that workers have been trained on, or by a written plan for items to review, questions to ask, etc.			W107
Yes	*	51.8%	
No		48.2	
Who receives worker inspection reports? (% indicating "yes")			M109 TO M115/ W109 TO W115
Worker members of JHSC	58.9%	52.1%	
Management members of JHSC	76.1	69.0	
Other workers not on your JHSC	15.9	15.0	
Management outside of JHSC	33.7	30.0	
Union	13.0	12.8	
None of the above	1.2	1.0	
NO REPORTS ARE PROVIDED	9.1	5.5	

* Not asked for management members.

4.4 PRESENCE, AWARENESS OF, AND ACTION ON DESIGNATED SUBSTANCES

4.4.1 Presence and Awareness of Designated Substances

A first question of importance is: How aware are JHSC members of the presence of designated substances? Of course, workers and management can only act to control designated substances if they know the designated substances are present. The greatest hazards will occur when workers and management are not aware of the danger they face.

We were concerned that JHSC awareness of designated substances could be imperfect, in two ways:

- o Management or worker members might be unaware of the presence of specific designated substances in their workplace.
- o Management or worker members simply might not know what a designated substance is, or whether any designated substances are present at all. (In fact, 7.7% of worker members and 2.4% of management members answered "don't know" when asked what designated substances were present in the workplace.)

We examined this issue further by comparing management and worker reports on presence of designated substances to data on the Ministry information system regarding presence of designated substances. As can be seen in Display 4.9 (below), significant numbers of workplaces are reported by JHSCs to have designated substances on the premises, although available data suggest that the Ministry is not aware of designated substances in these workplaces. As well, substantial numbers of JHSCs appear to be unaware of designated substances which, according to the Ministry information system, are on the premises.

If these results are accurate (and their importance, in the eyes of the consultant, calls for a supplementary validation study), they point to a major shortfall in the level of Ministry information about designated substances in a substantial number of workplaces. Indeed, of the more than 5,000 workplaces identified by the Ministry as not having designated substances, over 30% or perhaps more than 1,500 of these same workplaces were reported by JHSC members to have designated substances. The Ministry appears to be unaware of the designated substances on these sites.

Some of this difference could be accounted for by such factors as: (1) time delays in getting information into the Ministry information system; (2) errors in the information system; or (3) ambiguities in the guidelines for recording presence of designated substances.

DISPLAY 4.9
PRESENCE OF DESIGNATED SUBSTANCES AS INDICATED BY MINISTRY, VERSUS REPORTS OF JHSC MEMBERS*

Ministry of Labour Information (from Ministry information system matched to JHSC reports)	Management Reports	Worker Reports
Where Ministry records show presence of designated substances:		
JHSC members agree with Ministry view that designated substances are present	86.2%	81.4%
JHSC members disagree with Ministry view that designated substances are present (JHSC is unaware of designated substances)	13.8	18.6
	100.0%	100.0%
Where Ministry records show no designated substances are present:		
JHSC members agree with Ministry view that no designated substances are present	69.0	71.0
JHSC members disagree with Ministry view that no designated substances are present (Ministry is unaware of designated substances)	31.0	29.0
	100.0%	100.0%

*Analysis combines Ministry file data with survey variables M137 to M145/W137 to W145.

Another possibility is that member reports are inaccurate as regards this somewhat technical issue. This seems unlikely, given fairly good agreement between worker and management members (r = .53 and 74.5% correct cross-prediction of answers for matched worker-management member responses (Section 2.5, above)), and the existence of control programs in many of these workplaces.

4.4.2 Action on Designated Substances

The level of action in dealing with designated substances was examined for workplaces identified by the Ministry or by JHSC members as having designated substances. In Ontario, more than 2,000 workplaces with 20 or more workers are identified by the Ministry as falling into this category, while JHSC members' reports indicate that perhaps 3,500 workplaces have designated substances.

Survey results indicate that at the time of the survey (August-November, 1985), substantial gaps existed between the requirements of the Act (for assessments and control programs), and the actual degree of compliance. These results (Display 4.10, next page) are presented with designated substance workplaces defined in two ways: (1) for workplaces where the Ministry records presence of designated substances; and (2) for workplaces where JHSC members report presence of designated substances.

For example, management members indicate that only 71.3% to 82% of workplaces have completed assessments for all designated substances in the workplace. (Two figures are provided, based on alternate assumptions that: (1) JHSC assessments of presence of designated substances are correct; or (2) that Ministry assessments of presence of designated substances are correct.) Workers indicate an even lower level of compliance, with only 58.4% to 74.1% indicating that assessments had been completed for each substance which is present.

Similar response patterns of low compliance are found for two other key requirements under the Act: (1) that management consult the JHSC regarding the assessment; and (2) that each member of the JHSC receive a copy of the assessment. Very similar results are found in general between management and workers for a range of related questions on designated substances.

There may be two ways of looking at recommendations made by JHSCs regarding assessment and control programs. The first is that the 40% to 50% of JHSCs making recommendations is low and indicates a lack of involvement. Another perspective is that fairly sophisticated understanding and level of skill is required to address the complicated issues involved in these programs, and the 40% to 50% reflects well on a number of JHSCs that have come to terms with these difficult technical and scientific issues.

DISPLAY 4.10
STEPS TAKEN BY JHSCS IN DEALING WITH DESIGNATED SUBSTANCES

This table applies to more than 2,000
Ontario workplaces with designated substances
as identified by Ministry of Labour Information System
(Bracketed numbers apply to some 3,500 workplaces identified
by JHSCs as having designated substances)

Survey Question/Choices	Management Members	Worker Members	
(% indicating "yes for all designated substances," for the indicated steps)			W148 TO W155/ M148 TO M155
Has an assessment been conducted for each of the designated substances which is present?	82.9 (71.3%)	74.1 (58.4%)	
(WHERE ASSESSMENTS WERE DONE) Did management consult your JHSC in the assessment(s)?	80.9 (74.3%)	67.1 (60.4%)	
(WHERE ASSESSMENTS WERE DONE) Did each member of your JHSC receive a copy of the assessment(s)?	75.9 (68.1%)	56.0 (50.5%)	
Did the JHSC make any recommendations about the assessment?	44.7 (42.3%)	47.9 (45.5%)	
Are control programs in place for the designated substances identified as needing control programs in the workplace?	79.7 (69.0%)	66.9 (53.1%)	
Was your JHSC consulted about developing the measures and procedures for the control program(s)?	64.3 (61.5%)	54.9 (48.3%)	
Did the JHSC make recommendations about the control program(s)?	50.6 (48.9%)	48.5 (45.2%)	
Does your JHSC receive results of workplace testing/monitoring regarding designated substances?	81.5 (72.2%)	67.2 (60.9%)	

4.4.3 Discussion

Generally, results point towards these key findings regarding action on designated substances:

1. In a significant number of workplaces, JHSCs appear to be unaware of designated substances in their workplaces which are known to the Ministry of Labour.
2. In a significant number of workplaces, the JHSCs report the presence of designated substances which the Ministry is seemingly unaware of, according to its information system.
3. Many workplaces seem to have not yet completed the process of dealing with designated substances, need for control programs etc.
4. Reports of management and worker members of JHSCs are somewhat contradictory on these matters, with management members generally reporting 12% to 18% higher compliance than is reported by workers.

Certain of these findings, on awareness for example, may represent change which had simply not been captured by the Ministry information system as of time of the study, but this should be verified. Substantial numbers of worker JHSC members simply "did not know" what substances (if any) were present.

These results point to serious concerns, and a need for careful review of: awareness of designated substances, ability of JHSCs to identify them, and how effectively JHSCs are able to deal with designated substances.

That the Ministry of Labour information system appears to be unaware of the presence of designated substances in many workplaces is a finding of potential importance in the general operation of the responsibility system, and one to which we will return in our study conclusions and recommendations in Chapters 15 and 16.

4.5 INFORMATION FOR JHSCS: TYPE AND SATISFACTION

Adequate information to allow for effective health and safety policy was seen by Ham as a keystone of internal responsibility. Access to information was also identified as an important prerogative of JHSCs by the 1978 Act. Accordingly, we examined several aspects of information. Type of information available to JHSC was examined through reports of worker members of JHSCs. Satisfaction with information was assessed for both workers and managers.

4.5.1 Type of Information Available

Examination of the type of information available (Display 4.11, below) indicates that a wide variety of information is available to a majority of JHSCs, but that certain types of information are not generally available. For example, a strong majority (78.3%) indicate that information on designated and toxic substances is available. In contrast, only 58.2% indicate that they are able to obtain proprietary (trade secrets) information relevant to health and safety problems, and only 68.8% indicate that they are able to obtain information on new machinery or new technology.

In spite of the considerable availability of information, a substantial minority of JHSCs are reported not to have access to critical information. This lack is reflected in the evaluations of the adequacy of information provided below.

DISPLAY 4.11
TYPES OF INFORMATION AVAILABLE TO JHSCS

Survey Question/Choices	Management Members	Worker Members	
Are the following types of information available to your JHSC? (% indicating "yes")*			W127 TO W134
Proprietary (trade secrets) information relevant to health and safety problems	**	58.2%	
Information from workplace doctor/nurse/ industrial hygienist		54.5	
Workplace testing/monitoring information		74.2	
Information on designated substances		78.3	
Information on toxic substances		78.8	
Information on machinery, new technology		68.8	
Material safety data sheets		73.1	
Yearly company accident and health statistics		76.3	

*Excludes those indicating that each type of information "does not apply".
**Not asked for management members.

Satisfaction With Information

To examine adequacy of information, we asked both management and worker members to evaluate their satisfaction with information available to the JHSC.

Results (Display 4.12, below) show two divergent patterns for management and worker members of JHSCs. First, the overall satisfaction of management with information is high: management members rate type of information as adequate or better for 92.8% of JHSCs and inadequate for only 7.2% of JHSCs. Similarly, managers rate amount of information as adequate or better for 90.6% of JHSCs, and inadequate in only 9.4%.

Second, the evaluations of worker members are far less positive: information type and amount are judged as adequate or better in a majority of workplaces, but a far higher percentage of worker members evaluate the information they have as inadequate. Worker members report type of information to be adequate or better in 76.6% of JHSCs, and inadequate in 23.4%. Worker members report amount of information to be adequate or better in 71.7% of JHSCs and inadequate in 28.3%.

DISPLAY 4.12
SATISFACTION WITH INFORMATION

Survey Question/Choices	Management Members	Worker Members	
Satisfaction with type of information			M135/ W135/
Not satisfactory	.8%	7.4%	
Less than adequate	6.5	16.9	
Adequate	41.6	36.2	
More than adequate	37.1	24.3	
Fully Satisfactory	14.1	15.1	
Satisfaction with amount of information			M136/ W136
Not satisfactory	1.1	9.1	
Less than adequate	8.3	19.2	
Adequate	38.2	34.6	
More than adequate	37.5	23.6	
Fully Satisfactory	14.7	13.5	

Discussion

Again, as with our examination of scope of committee activity and treatment of designated substances, a significant difference emerges between evaluations of management and worker members of JHSCs. These findings indicate that worker members are far less satisfied with information available to them on health and safety matters in the JHSC.

This evidence seems to suggest that management members may give different responses about what the JHSC is doing, simply because they have more information about most aspects of health and safety in the workplace.

This explanation seems very plausible, especially in mid-size to larger workplaces, because more management members would have full-time responsibilities in this area, and because more may be health and safety professionals or have access to health and safety professionals. More time at work and more experience means that they could learn more and obtain more information. But this may also be information which is not shared fully with the JHSC, for very ordinary reasons such as a "busy agenda", or because a management member may have information (in his or her head), but not contribute it to discussions where workers might see its relevance. (As well, information may not be in a form suitable for worker members to understand.)

Above, we demonstrated that management and worker members of JHSCs are very different in their awareness of one critical piece of information -- awareness/presence of designated substances. (In Section 4.4.1 we noted that: (a) worker members (7.7%) were much more likely than management members (2.4%) to reply "don't know" when asked about presence of designated substances; and (b) 18.6% of worker members of JHSCs appeared to be unaware of designated substances in the workplace (according to the Ministry), as compared to 13.8% of management members.)

Next, our analysis will suggest certain patterns which further support this hypothesis regarding more information being available to management. Particularly, findings to be considered will relate to the ways in which contacts with the Ministry of Labour generally seem to provide more information to management members than to worker members of JHSCs.

These findings relate to one of several underlying themes emerging in these study results. This might be called the contradiction of manager-worker specialization in the internal responsibility system.

The contradiction stems from the fact that management is generally better able to obtain information and expertise in health and safety matters, and better able to allocate work-time to learning about health and safety matters. This is especially likely to be the case in organizations where management members are full-time specialists in health and safety. The contradiction is that lack of worker skill and knowledge may greatly inhibit their participation in joint problem-solving, thus undermining the cooperative problem-solving processes.

5. JHSC PROCESS: COMMITTEE RELATIONSHIPS, PROBLEM-SOLVING, NEGOTIATION, AND INVESTIGATIONS

5.1 THE GENERAL ENVIRONMENT OF JHSC RELATIONSHIPS

Quality of the working relationships among JHSC members was examined because of the widespread hypothesis (Beaumont et al., 1982; Ham, 1976; Burkett, 1981) that cooperative committee relations are central to effective problem-solving in JHSCs.

Relationships among members of the JHSC were explored by asking worker and management members to evaluate various aspects of committee relationships, particularly, the extent to which these were seen as involving cooperation, mutual respect, trust, and friendly exchanges, as opposed to conflict, no mutual respect, no trust, and hostility.

Overall, the results (Display 5.1, next page) point to a generally positive climate of relationships in Ontario JHSCs. Management members rate committee relationships as positive in about 90% of JHSCs, while workers rate committee relationships as positive in about 75% of JHSCs.

Generally, these findings point to considerable success in establishing committees that can "work together". They suggest that the cooperative process is a central feature of most of Ontario's JHSCs.

But the study results also point to a small number of workplaces where JHSCs are not working cooperatively at all. Some 2% to 9% of JHSCs are seen by management and worker members as "conflicting" and "hostile". This group represents a sub-group of the committees where the cooperative process is not in place.

In later portions of this report, we will demonstrate that cooperative committee relationships are a key to the success of JHSCs (particularly Chapter 12).

DISPLAY 5.1
COMMITTEE RELATIONSHIPS

Survey Question/Choices	Management Members	Worker Members	
Indicate for each of these four ratings, the kind of relationships between worker and management sides of this JHSC.			W179 TO W182
Conflicting	2.6%	8.5%	
In-between	8.0	19.6	
Cooperative	89.4	71.9	
No Mutual Respect	2.5	7.4	
In-between	7.3	15.9	
Good Mutual Respect	90.2	76.7	
Not Trusting	3.1	11.2	
In-between	7.5	18.2	
Trusting	89.4	70.6	
Hostile	2.2	6.5	
In-between	7.0	15.5	
Friendly	90.8	78.0	

5.2 DISTRIBUTION OF INFLUENCE

Surprisingly, in light of the tendency towards management control of the chair (Section 4.2.1, above), assessments of distribution of influence in JHSCs suggest that worker members are seen as having influence equal to management members in a majority of JHSCs. Generally, management and worker reports indicate that worker members have equal influence in about 60% of JHSCs.

Management members however, tend to have more influence in a substantial percentage of JHSCs. Managers were found to have more influence in about 25% to 35% of JHSCs, as compared to workers having more influence in about 10% of committees. This evidence is seen, therefore, as consistent with earlier findings regarding control of the chair which suggested that management has a general "edge" in JHSC activites.

DISPLAY 5.2
DISTRIBUTION OF INFLUENCE

Survey Question/Choices	Management Members	Worker Members	
			W099
How would you rate management and worker members of the JHSC as regards general influence in the JHSC (ability to direct discussion and influence decisions)?			
Managers have more influence	23.1%	27.4%	
Equal	66.9	60.3	
Workers have more influence	10.0	12.3	
			W100/ M100
How would you rate management and worker members of the JHSC as regards general influence over JHSC structure and procedures (decisions about things like number of members, rules for meetings, etc.)			
Managers have more influence	34.0%	34.5%	
Equal	59.7	55.1	
Workers have more influence	6.3	10.3	

Management's role in the overall JHSC process, of course, is greater than these results would suggest. In most workplaces, management alone makes the ultimate decision of whether to implement JHSC recommendations or not.

As is shown in the next section, management members' somewhat greater influence in JHSC deliberations is also manifested in a more active management role in problem-solving and negotiations.

5.3 PROBLEM-SOLVING AND NEGOTIATING STRATEGIES

To assess how committees work together, we asked worker and management members of JHSCs to describe each others' problem-solving actions and negotiating behaviours. Problem solving behaviours included such actions as "proposing a sub-committee," "providing information" and "proposing solutions". Negotiating behaviour included such items as: "denying a problem existed," and threats of various sorts (see Displays 5.3 and 5.4, next two pages, for categories of problem-solving and negotiating behaviour).

5.3.1 Results: Emphasis on Problem-Solving

These results (Display 5.3 and 5.4, next two pages) generally point towards two conclusions:

1. First, problem-solving behaviour is far more common than negotiating behaviour in JHSCs. Relatively large percentages of workers and managers each report that the other had engaged in such positive actions as "proposed new solutions to an issue", "provided information that the JHSC needed" and "proposed seeking additional information". Some 72.3% of management members and 65.7% of worker members are reported to have engaged in one or more problem-solving behaviours.

   In contrast, relatively few managers or workers were reported to have engaged in "threat" or negotiating behaviour such as "indicated would take an issue to the Ministry of Labour", or "indicated a previous agreement would be withdrawn". (Although a fairly large number of management members are reported to have "denied a problem was serious" -- a strong negotiating strategy.) In total, some 31.5% of management and 17.8% of worker members are reported to have engaged in one or more negotiating behaviours.

2. Second, management members seem to be more generally active on committees, particularly in problem-solving. On every problem-solving strategy examined except "proposed new solutions to an issue", managers are more likely than workers to engage in problem-solving behaviour. Put simply, the initiative usually tends to be with management.

5.3.2 Discussion

This second finding suggests that the full potential of worker input to the joint problem-solving process is not being achieved, since their contribution, especially to problem-solving, is less.*

Several explanations may account for this lower contribution to problem-solving, most importantly: relative disadvantage of worker members in overall training. That training is a key contributor to problem-solving is clearly indicated by significant correlations of worker problem-solving behaviour with scope of training (r = .178) and amount of training (r = .201). As well, disadvantage in information and greater control by management members of offices and procedure in the JHSC process may lessen worker member participation.

DISPLAY 5.3

PROBLEM-SOLVING STRATEGIES

Survey Question/Choices	Reports on Workers, by Management Members	Reports on Management, by Worker Members	
In the past 12 months, have management (worker) members of the JHSC done any of the following things to help resolve an issue that could not be agreed upon? (percentage ever reporting this in past 12 months).			W184 TO W189/ M184 TO M189
(a) Proposed forming a sub-committee to review a difficult issue	12.4%	16.6%	
(b) Proposed seeking advice from outside experts	37.6	48.8	
(c) Proposed seeking additional information from managers or workers outside of the JHSC	45.8	51.2	
(d) Found out how an issue was dealt with in another workplace	28.5	35.4	
(e) Provided information the JHSC needed	51.4	62.5	
(f) Proposed new solutions to an issue	63.3	64.4	

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*That this is so, is suggested by an examination of the same behaviours in unionized workplaces only. Worker representatives are found to be more active both in problem-solving behaviour and negotiating behaviour in unionized workplaces, where worker resources and influence tend to be somewhat greater.

DISPLAY 5.4
NEGOTIATING STRATEGIES

Survey Question/Choices	Reports on Workers, by Management Members	Reports on Management, by Worker Members	
In the past 12 months, have management members of your JHSC done any of the following types of negotiating to get agreement on issues your JHSC could not agree on?			W196 TO W200
(a) Denied a problem was serious	*	26.0%	
(b) Refused to discuss a problem		7.9	
(c) Indicated that previous agreements on health and safety improvements might be withdrawn or delayed		13.9	
(d) Indicated that an issue threatened closure/layoffs		5.6	
(e) Indicated would take issue to Ministry of Labour		7.7	
In the past 12 months, have worker members of your JHSC (or their union/association if any) done any of the following types of negotiating to get agreement on issues your JHSC could not agree on?			M201 TO M205
(a) Indicated that previous agreements related to health and safety improvements might be withdrawn or delayed	3.3%	**	
(b) Indicated would take issue to collective bargaining	5.7		
(c) Indicated would present grievances on health and safety	8.2		
(d) Indicated would take an issue to Ministry of Labour	15.2		
(e) Indicated would go to press/media	1.4		

* Not asked for management members.

**Not asked for worker members.

5.4 JHSC REPORTED RECOMMENDATIONS

JHSC recommendations were examined as one indicator of committee activity. We speculated that a JHSC which made recommendations was more likely to be one which had an impact, and that this would therefore be an important feature of functioning.

Accordingly, we examined several indicators of recommendation activity: simple number of recommendations made, numbers of recommendations made which involved expenditures, and the percentage of general and spending recommendations implemented.

5.4.1 Making Recommendations

Survey results indicate that JHSCs vary greatly in the extent to which recommendations are made and implemented. They especially vary in the extent to which recommendations require expenditures.

A substantial minority of committees are reported to make no recommendations whatsoever. This is reported by managers for 18.9% of JHSCs and by worker members for 26% of JHSCs. Another minority of committees (29% as reported by managers and 38.2% as reported by workers) make no recommendations which called for spending by employers.

Yet overall, the committee level of activity seems to be high for most JHSCs, pointing to a general tendency towards success in this type of committee function. Apparently, 74% to 82% of committees make recommendations, and 61.8% to 71% of committees make recommendations which call for spending.

5.4.2 Success of Committee Recommendations

JHSCs were reported to have a reasonable rate of success with recommendations. Some 91.2% of management members and 76.5% of worker members report more than half of general recommendations are implemented. As for recommendations calling for spending, 71.1% of management members and 61.4% of worker members report more than half of these types of recommendations are implemented. Indeed, worker members of 41.3% of JHSCs report that management never rejects recommendations at all (Display 5.6, next page).

DISPLAY 5.5
RECOMMENDATIONS

Survey Question/Choices	Management Members	Worker Members	
Approximately how many recommendations has your JHSC made in the past 12 months?			W167
None	18.9%	26.0%	
1 to 5	28.0	25.2	
More than 5	53.0	49.2	
What percentage of these recommendations were, or are now being implemented by management?* (computed as a % of those with any recommendations)			W168
0 to 25%	4.2%	10.5%	
26% to 50%	3.9	13.0	
51% to 75%	15.9	16.3	
76% to 100%	75.9	60.2	
Approximately how many recommendations has your JHSC made in the past 12 months which called for spending by the employer?			W169
None	29.0%	38.2%	
1 to 5	39.4	31.1	
More than 5	31.6	30.7	
What percentage of these more costly recommendations were, or are now being, implemented?* (computed as % of all spending recommendations)			W170
0 to 25%	16.3%	26.4%	
26% to 50%	12.6	12.2	
51% to 75%	9.4	10.1	
76% to 100%	61.7	51.3	

*Computed from survey questions asking for number of recommendations of each type and number implemented.

5.4.3 Reasons for Rejection of Recommendations

The main reasons that were indicated as to why management did not accept recommendations are: cost, and disagreement as to whether a recommended change is needed (see Display 5.6). As well, in a noteworthy 10.1% of cases, worker members report that management did not explain its reasons at all. Both of these results seem curious, as we note below.

Firstly, if management were well linked into the JHSC process, their representatives would be less likely to agree at all with recommendations that management would reject. The evidence therefore suggests that management is at least some of the time, rejecting recommendations agreed to by its own health and safety representatives.

Secondly, cases where management does not adequately explain its reasons for rejecting recommendations are seen by researchers as indicating a major problem in the integration of JHSCs with management in the overall internal responsibility system. In some firms, this integration appears to be sorely lacking.

DISPLAY 5.6

MANAGEMENT REASONS FOR REJECTING RECOMMENDATIONS

Survey Question/Choices	Management Members	Worker Members	
What are management's usual reasons for rejecting recommendations? (% indicating "yes" for each reason)			W173 TO W178
Cost	19.5	35.7%	
No technology exists	7.6	5.0	
Don't believe recommended change is needed	33.1	33.5	
Need for engineering/plans, design	12.5	14.5	
Management does not explain	1.1	10.1	
Management does not reject recommendations	49.3	41.3	

Discussion

Ham's development of the concept of internal responsibility centred on important concepts of openness and cooperation. Yet, as we noted, the 1978 Act fell short in one interesting manner: the firms were not, in a general way, required to consult with JHSCs on health and safety matters.

This gap is reflected in the lack of communication evidenced in some workplaces, which must severely limit the effectiveness of those JHSCs. Indeed, if we assume that the mandated minimum of an advisory role of JHSCs should include a response from management to advice, then one could conclude that in a firm where management does not explain why advice is rejected, internal responsibility is not working, and the JHSC cannot be effective.

5.5 RESOLUTION OF ISSUES

We hypothesized that health issues would present more problem to JHSCs than safety issues because of: evolving concerns and lack of scientific information on chemical exposures; the latency period for many industrial diseases; and the introduction of new technology.

As Display 5.7 reveals, no great difference is found between resolution of health as opposed to safety issues (as perceived by the committees), although a slightly increased response is seen for "most health issues not dealt with" as compared to safety.

DISPLAY 5.7
RESOLUTION OF HEALTH VERSUS SAFETY ISSUES

Survey Question/Choices	Management Members	Worker Members	
Has your JHSC ben able to deal with the most important health issues, or have many important health issues been avoided or not resolved?			W171/ M171
All important health issues dealt with	61.6%	43.4%	
Most important health issues dealt with	36.0	38.6	
Most health issues not dealt with	2.5	7.0	
Has your JHSC been able to deal with the most important safety issues, or have many important safety issues been avoided or not resolved?			W172/ M172
All important safety issues dealt with	59.9%	47.9%	
Most important safety issues dealt with	38.3	43.2	
Most safety issues not dealt with	1.8	4.5	

5.6 INVESTIGATIONS

Careful attention was given to identifying investigations which fall under the Act and involve JHSCs, and determining how these are handled in workplaces. Two types of investigations were considered: (1) investigations of work refusals; and (2) investigations of critical injuries/fatalities.

5.6.1 Frequency of Investigations Required

Generally, only a small (but significant) minority of workplaces were reported to require investigations in the 12 month period covered by the survey. Within these workplaces, worker and management members of JHSC differed considerably in their reports as to the frequency of events calling for investigations.

Management members, for example, report only two-thirds as many work refusals (11.3%) as worker members (16.2%). Worker members report nearly twice as many critical injuries (20.7%) as management members (10.3%).

DISPLAY 5.8
FREQUENCY OF INVESTIGATIONS

Survey Question/Choices	Management Members	Worker Members	
Any work refusals?			W119/ M119
Yes	11.3%	16.2%	
No	88.7	83.8	
Any critical injuries/fatalities?*			W125/ M125
Yes	10.3%	20.7%	
No	89.7	79.3	

*Nearly all data related to critical injuries. Very few fatalities were reported by workers and management; critical injury was defined in detail. (See questionnaires, Appendix C.)

These differences may result from disagreement as to what these events involve, or alternatively, the differences may relate to different awareness of what is "going on" in the workplace. Disagreement over what a work refusal is, or what a critical injury is may thus stem from lack of training in, or understanding of, these provisions of the Act (see: *Section 3.4.3* and *Section 4.1.2*).

5.6.2 Conduct of Investigations

Since there is noteworthy disagreement on occurrences in the workplace that might require investigations, it should be no surprise that workers and managers present different views on the subsequent events surrounding investigations.

Our approach was to assess compliance, as indicated by the reponse "always" for these three investigation questions: (1) "How often did a worker JHSC member (or worker representative) participate in the investigation of work refusal(s)?; (2) In the past 12 months, how often was your JHSC informed of the above critical injuries/fatalities?; and (3) In the past 12 months, how often did a worker JHSC member take part in the investigation of the above critical injuries/fatalities?

As can be seen in Display 5.9 (below), two important results are evident: (1) substantial non-compliance is suggested generally; and (2) worker members' reports of non-compliance are generally much higher than those of management members.

5.6.3 Discussion

Even assuming that the "best" assessment is correct (in this case, that of management members), full compliance in investigations appears to be very low (75% and 82%), relative to what is required under the Act. These results seem to point to serious problems as regards investigations provisions of the Act.

The fact that compliance with these important provisions of the Act seems partial at best, is a matter of serious concern, from both an enforcement and an educational perspective.

DISPLAY 5.9
INVESTIGATIONS BY JHSC

Survey Question/Choices	Management Members	Worker Members	
How often did a worker JHSC member (or worker representative) participate in the investigation of work refusal(s)?			W119/ M119
Always	81.5%	56.5%	
Usually	12.2	18.5	
Sometimes	2.3	9.7	
Never	4.0	15.2	
In the past 12 months, how often was your JHSC informed of the above critical injuries/fatalities?			W125/ M125
Always	95.8%	58.2%	
Usually	0.6	14.2	
Sometimes	0.4	8.6	
Never	3.1	18.9	
In the past 12 months, how often did a worker JHSC member take part in the investigation of the above critical injuries/fatalities?			
Always	75.0%	42.8%	
Usually	6.9	10.9	
Sometimes	5.8	10.8	
Never	12.3	35.5	

6. RELATIONSHIPS OF THE JHSC TO THE WORKPLACE AND THE MINISTRY OF LABOUR

Ham (1976), outlined a concept of the internal responsibility system which encompassed a high level of cooperation within the workplaces. His concept of the broader responsibility system included as well, an important role for external authority (Ministry of Labour) in the broader responsibility system. Both of these important elements, communications within the workplace, and linkages to Ministry of Labour, are examined here.

6.1 COMMUNICATIONS WITH MANAGEMENT, WORKFORCE, AND UNIONS

6.1.1 Reports and Communications Within the Workplace

If the concept of internal responsibility is to be meaningful and truly improve the protection of workers, there must be good communication among the JHSC, management in general, and the workforce.

In this context, the existence of the JHSC is not a remedy to problems of health and safety by itself. Rather, it is seen as a focus for the mobilization of a variety of resources in the workplace to understand and resolve problems. Within this theoretical model of JHSCs and internal responsibility, the JHSC must seek information from and give feedback to management and workers in general to be effective.

To address this important committee function, we examined the nature of reporting and communication for JHSCs, particularly reports of committee members to management in general, and reports to workers in general in a two-way discussion situation.

6.1.2 Results

These results (Display 6.1, to follow) show that communication links between JHSCs and the workplace in general are poor, or at best uneven. Worker members report that two-way discussion with workers in general, takes place in 37.5% of JHSCs at least monthly, but a significant percentage of worker representatives indicate that they report to workers in general only every 3 to 12 months (27.3%), and 35.2% of worker representatives indicate that they never report to workers in general at such meetings.

Management members are more inclined than worker members to report on the activities of the JHSC to their management colleagues outside of the committee, and 57.4% of management members indicate that they make these reports monthly or more often. This situation is likely a function of the fact that managers form a smaller, more cohesive group than do workers and formal lines of communication exist for management members to communicate and consult frequently with other managers.

A broad indication of how well JHSC members inform the workplace about their activities is that a little over 60% post the committee's minutes and reports in the workplace. In 15% to 19% of workplaces, it appears that no attempt is made either to post committee minutes or distribute them to management and workers in general. These committees appear to operate in relative isolation, especially from workers, and perhaps from management as well.

6.1.3 Discussion: Significant Gaps in Workplace Communication

Earlier in our discussions of committee recommendations, we noted that a small but significant percentage of JHSCs seemed to be not connected to, or not working with management. We drew this conclusion from the responses of workers indicating that some 10% of JHSCs never received explanations from management as to why recommendations were rejected.

Here we see that breakdown of communications/cooperation on the JHSC-management side is paralleled by even greater gaps on the JHSC-workforce side, with substantial numbers of JHSCs never reporting to the workforce at all.

These gaps are found to be particularly severe in non-unionized workplaces. Of JHSCs in unionized workplaces, 61% indicated that they report to worker meetings at least quarterly, as compared to 46.5% of JHSCs in non-unionized workplaces. Of JHSCs in unionized workplaces, 17.5% indicate they never report to either workers in general at meetings, or to the union, while 37.9% of JHSCs in non-unionized workplaces never report to workers in general at meetings.

DISPLAY 6.1
REPORTING AND COMMUNICATIONS IN THE WORKPLACE

Survey Question/Choices	Management Members	Worker Members	
How often do worker members of your JHSC report to workers at meetings where two-way discussion is possible?			W207
Monthly or more often	*	37.5%	
Every three months		19.0	
Every six months		4.2	
Once every twelve months		4.1	
Never		35.2	
How often do worker members of your JHSC report to union/association officers? (% for unionized workplaces only)	*		W321
Monthly or more often		48.2%	
Every three months		15.3	
Every six months		5.4	
Never		31.1	
How often do management members of your JHSC report to managers not on your JHSC regarding health and safety matters?			M206
Monthly or more often	57.4%	**	
Every three months	21.8		
Every six months	4.5		
Once every twelve months	3.0		
Never	13.4		
What is done with your JHSC's minutes/ reports? (% indicating "yes")			W208 TO W211/ M208 TO M211
Posted in the workplace	63.1%	62.2%	
Distributed to workers	25.5	16.0	
Distributed to managers	57.4	37.3	
None of the above	14.5	18.8	

* Not asked for management members.
** Not asked for worker members.

6.2 COMMITTEE INTERACTION WITH THE MINISTRY OF LABOUR

Ham identified public action (legislation, monitoring and compliance) as a key element in the overall responsibility system (Ham, 1976, page 5). In addition, past research which we examined in the design phase of this study, pointed towards the "level of enforcement" (inspections, orders etc.) as a significant facilitator of problem-solving in joint health and safety committees (Kochan, 1978).

The study team was also impressed by the Ministry's concept of the inspectors' role in relation to the JHSC. With passage of the 1978 Act, broad changes were introduced to the Ministry Operations Manuals. Recognizing the degree of institutional change and development required to introduce JHSCs on the scale required, a new role for the inspector was identified in the Operations Manuals, as **facilitator** of JHSCs. Numerous steps were outlined for inspectors, including giving feedback to JHSCs, facilitation of problem-solving, and communications at several points with the JHSC, particularly in relation to regular inspections.

Examining the Ministry's role is essential in evaluating JHSCs and the related features of the Act. But the Ministry's role is considered with caution, for two reasons: (1) the study terms of reference do not explicitly include examination of the Ministry's role, but only relation to JHSCs; and (2) data on the Ministry's role is limited, with most conclusions here derived from JHSC member perceptions and reports of experiences with the Ministry and its inspectors.

Within these constraints, three aspects of JHSC interactions with the Ministry of Labour were examined: (1) general contact through inspections and writing of orders; (2) the proactive role of the Ministry inspector in relation to the JHSC (facilitating the work of the committee); and (3) Ministry role in disputes.

6.2.1 Inspections and General Linkages to the Ministry of Labour

Inspections

The most typical involvement of JHSCs with the Ministry is through the regular inspections which the Ministry undertakes in industrial workplaces and mines.

It is useful for the reader to understand the system of inspections, so a brief explanation will be provided.

- o First, it is important to note that all code "L" workplaces (20 workers or more, where a committee is required by the Act) are inspected.

- Second, the frequency of inspection varies on the basis of Ministry judgement of need for external intervention. This need is reflected by an "inspection cycle" code assigned to each workplace, which roughly indicates whether the workplace is to be inspected every 3 months, every 6, or 9, or 12 ... or 36 months.

  Workplaces which are high in presumed danger (e.g. presence of designated substances) or where health and safety problems have been recurring, are assigned to a more frequent inspection cycle, as are workplaces where JHSCs are seen to be ineffective.

  The inspection cycle code becomes a tool to aid in strategic allocation of scarce staff time to the thousands of workplaces which could be inspected.

Generally, reports by JHSC members reflect the expected pattern of great range in frequency of inspection. About 20% of JHSCs report that the Ministry is inspecting the workplace every 3 months, 30% to 35% every 6 months, and another 30% to 35% every 12 months. A small percentage of workplaces (less than 10%) are reported to be inspected every 24 or 36 months.

Of particular interest is the 20.1% response for workers who "don't know" how often their workplaces are inspected. It is likely several factors can be used to explain this response. Possible interpretations could include some workplaces have not been inspected in the memory of the worker members, others where the presence of the inspector is routine and unnoticed. But more likely, as we will note below, is the possibility that these worker members are unaware of Ministry inspections because of imperfect communications/linkages between the Ministry inspections and the JHSC.

More important perhaps than frequency, is the nature of the link of Ministry inspections to the JHSC. Management members report always accompanying Ministry inspectors 75% of the time, while worker members report always accompanying the Ministry inspectors only 65% of the time. Importantly, these data suggest a weaker than desirable connection of the Ministry inspection process to JHSCs. Further, the difference between reports of management and worker members is seen as suggesting more frequent linkages between the Ministry and the management side of the committee as opposed to the Ministry linkage to the worker side of the JHSC.

Clearly, the Ministry inspections are imperfectly linked to JHSCs, and perhaps uneven in their relation to management as opposed to worker members. These findings are a matter of concern for two reasons: (1) the JHSC receives less than full information from the inspection process; and (2) if workers are linked less effectively to Ministry inspections, then they have less information to contribute to the joint problem-solving process, and also miss out on opportunities to learn from the inspectors.

DISPLAY 6.2
INSPECTIONS BY THE MINISTRY OF LABOUR

Survey Question/Choices	Management Members	Worker Members	
On average, about how often is the workplace inspected by the Ministry of Labour? (frequency estimates exclude "don't knows")			W264/ M264
Every 3 months	20.4%	23.6%	
Every 6 months	35.7	34.7	
Every 12 months	36.0	33.0	
Every 24 months	5.4	5.9	
Every 36 months	2.6	2.9	
Don't know*			
How often do management/worker members of your JHSC accompany Ministry of Labour inspectors when they inspect the workplace?			W266/ M266
Always	75.4%**	65.2%***	
Usually	11.6	10.7	
Sometimes	8.5	10.3	
Never	4.5	13.8	

*"Don't know's" were excluded from computation of these percentages, 9.7% of management members were not aware of Ministry inspections as compared to 19.3% of worker members. See text for discussion.

**Frequency managers accompany inspectors.

***Frequency workers accompany inspectors.

Other Linkages to the Ministry

JHSC members report good access to Ministry documentation. Of management members, some 99% report that the JHSC has access to Ministry orders and inspection reports. Such access is reported by about 91% of workers -- less than for managers, but still very high.

Worker JHSC members were also asked how regularly they followed up on Ministry inspectors' orders, to see if they were implemented. They indicate that in 71% of JHSCs, Ministry orders are always followed up to assure implementation.

DISPLAY 6.3
REPORTS/ORDERS FROM THE MINISTRY OF LABOUR

Survey Question/Choices	Management Members	Worker Members	
Are copies of Ministry inspection reports available to your JHSC?			W268/ M268
Yes	98.7%	92.6%	
No	1.3	7.4	
Are copies of Ministry orders available to your JHSC?			W269/ M269
Yes	98.8%	90.8%	
No	1.2	9.2	
Does your JHSC follow up on Ministry inspector's orders to see if they are implemented?			W270
Always	*	71.0%	
Usually		16.1	
Sometimes		5.6	
Never		7.3	

* Not asked for management members.

6.2.2 Proactive Role of the Ministry Inspector

The role of the inspector, and particularly the extent to which the inspector was "proactive" in assisting JHSCs, was closely examined.

We examined several aspects of inspector behaviour which are prescribed by the Ministry Operations Manuals, and which we regarded as proactive in facilitating JHSCs. Most importantly, we asked whether inspectors: "reviewed JHSC minutes"; "discussed results of inspections with worker or manager JHSC members"; or "gave advice on how to improve JHSC effectiveness".

Results

Results of the survey suggest that these activities were engaged in somewhat sporadically by Ministry inspectors. This is a surprising result, since these steps are required by the Operations Manuals for the Inspection Branch:

- o Only about half of managers (54.2%) and less than half of worker members (42.0%) report that inspectors always review JHSC minutes.
- o A little more than half of management members (62.1%) report that inspectors always discuss results of inspections with management members of the JHSC.
- o Less than half of worker members report that inspectors always discuss results of inspections with worker members of the JHSC.

Discussion

These findings are important for three reasons:

- o First: the evidence indicates that an important link between the Ministry inspection process and JHSCs is not being fully maintained. A substantial minority of JHSC members report receiving only partial feedback from inspectors. JHSC members' responses on "discussions of inspection results" suggest that in many cases, important inspection information is flowing only to persons not on the JHSC. We assume that usually this would be non-JHSC managers.* In contrast to a method which would enhance the importance of internal respon-sibility, the evidence suggests that JHSCs are often left out of more direct exchanges between inspectors and management.
- o Second: worker members of JHSCs appear to be less informed about inspections, and have less contact with inspectors than management members.
- o Third: overall, the proactive role of the inspector in facilitating and supporting the internal responsibility system seems to be only partly fulfilled.

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*The alternative explanation would be that inspectors are communicating with no one in the workplace or with workers not on the JHSC. These seem to the researchers to be unlikely alternatives.

Several somewhat speculative explanations could be offered for this type of "weak link" in the JHSC-Ministry process. But two most plausible explanations appear to be: (1) that the Ministry substantially underestimated the manpower requirements of implementing the new Act, and bringing about the significant social change involved in establishing JHSCs on the scale attempted; and (2) that Ministry training and orientation of Inspection Branch staff to these tasks may have been less than required.

DISPLAY 6.4

PROACTIVE ROLE OF THE MINISTRY'S INSPECTORS

Survey Question/Choices	Management Members	Worker Members	
Do Ministry inspectors do the following? (% indicating "always" estimated with "don't know's" excluded)			W274 TO W279/ M274 TO M279
Review JHSC minutes	54.2%	42.0%	
Provide referrals to other organizations or other branches of the Ministry for information/assistance	14.0	14.3	
Give advice on how to improve JHSC effectiveness	17.2	18.9	
Follow-up on previous orders or suggestions	60.2	56.6	
Discuss results of inspection with (manager) worker members of JHSC	62.1	48.1	
Ask if there are any other outstanding problems that should be reviewed	67.0	62.6	

6.2.3 Ministry Role in Disputes

The Ministry's role in disputes was examined in three areas: (1) disputes regarding designated substances; (2) work refusals; and (3) disputes within the JHSC.

Disputes are not very frequent, but overall, the results suggest that disputes or disagreements may be an important part of the Ministry's and its inspectors' involvement in JHSCs. For example:

1. Among workplaces with designated substances, 22% (management member reports) to 28% (worker member reports) of JHSCs report Ministry involvement in disputes over designated substances.
2. Among the smaller number of workplaces that experienced work refusals, Ministry staff are involved in resolving these disputes 40% to 56% of the time.
3. Management and worker members for about 50% of JHSCs, report that Ministry inspectors are involved in resolving disputes which have arisen in JHSCs.

The Ministry of Labour inspectors have a considerable presence in JHSCs with respect to resolving disputes within the committee. This result could be interpreted to mean that a significant proportion of JHSCs experience either serious or minor disputes at one time or another. Dealing with disputes thus appears to be an important role for Ministry inspectors, and one which needs to be better understood.

DISPLAY 6.5
MINISTRY ROLE IN DISPUTES

Survey Question/Choices	Management Members	Worker Members	
Has the Ministry of Labour been called in to resolve any dispute about an assessment or control program? (computed for workplaces with designated substances)			W156/ M156
Yes, for all	12.8%	12.8%	
Yes, for some	9.8	14.8	
No	77.4	72.5	
How often was the Ministry of Labour called in to resolve work refusal(s)? (computed for workplaces where work refusals are reported)			W121/ M121
Always	18.7%	11.5%	
Usually	4.4	5.0	
Sometimes	32.7	24.1	
Never	44.2	59.4	
Do Ministry inspectors attempt to resolve disputes which have arisen in the JHSC?			W280/ M280
Always	21.8%	20.8%	
Usually	13.6	16.4	
Sometimes	16.2	12.3	
Never	48.3	50.5	

6.2.4 Discussion: The Significance of Variations in the Ministry Role

Of all these results, perhaps the most striking are those suggesting that, for whatever reason, considerable variations are reported by JHSCs in the nature of linkages to the Ministry.

These variations appear to reflect substantial departures from the official strategy of the Ministry as outlined by its Operations Manual.

More important by far, are these considerations:

1. The fact that JHSC members in different workplaces report variations in level of Ministry support raises the question as to whether workers in different workplaces are afforded differing levels of protection by the Ministry's inspection program.
2. In Part III of this report, we provide evidence that the Ministry's facilitative role is an important one for success of JHSCs, and thus suggest that increased Ministry activity is one of the most effective avenues for improved functioning of JHSCs.

The issue of increased Ministry role will be a recurrent one in subsequent sections and conclusions of this report.

7. ASSESSMENTS OF PERCEIVED SUCCESS/IMPACT

In accordance with the overall study objectives, we examined several areas of perceived JHSC success and impact. Particularly, assessments of: (1) perceived impact in 5 areas such as reducing hazards, improving health and safety concerns in the workplace, and actual changes; (2) perceived success of inspections; (3) perceived impact on danger; and (4) overall evaluation of JHSC as to effectiveness in protecting health and safety of workers.

7.1 PERCEIVED IMPACT AND FUNCTIONING IN FIVE AREAS

7.1.1 JHSCs Which Perform Well

Generally, management and worker members for most JHSCs report that their JHSCs' impact was good in the five areas examined. They tend to rate their JHSCs positively on each aspect of impact examined (see Display 7.1, to follow). For example:

- Overall track record in improving safety and reducing accidents was rated very positively (56.2% of management members rate their JHSCs as better than adequate to excellent; as do 59.4% of worker members).

- Overall track record in reducing potential health hazards was rated very positively (60.3% of management members rate their JHSCs as better than adequate to excellent, as do 58.9% of worker members).

This same pattern of general positive ratings was repeated, although less strongly, on other aspects of performance: actual changes towards improving health and safety; and improving knowledge and concern about health and safety among workers and managers. Although these last elements were rated less positively, JHSC members in most workplaces, about 58%, generally rate their JHSCs very positively.

7.1.2 JHSCs Which Perform Adequately

Apart from the majority of JHSCs evaluated positively, committee members identified a substantial minority of JHSCs (about 30%) which are regarded as performing only adequately. This group is of special concern, as it represents most of those JHSCs which are in need of improvement.

This topic is the focus of Chapter 9 where JHSC members outline their views of what their committees need to do a better job, and the topic is examined further in Part III of this report which deals with regression results.

7.1.3 JHSCs Which Perform Poorly

Within this pattern of general tendency towards success, it is still important to note that less than adequate to poor performance is consistently noted for a minority of JHSCs (about 12%, on average).*

This problem is noted by worker and management members alike. Responses by management members suggest that this minority is 5 to 15% of all JHSCs. Worker member assessments suggest this situation exists in 10 to 25% of workplaces. Either way, these may indicate a significant problem for the impact of the Act, since the safety and health of substantial numbers of workers are at issue.

As we illustrate below, this pattern of perceived overall success, and a small minority of perceived "failed" JHSCs is affirmed by the variety of committee member responses shown in Sections 7.2 and 7.3 (to follow).

7.1.4 Areas of Greater and Lesser Impact

Worker and management members agree that inspections by worker JHSC members are an area of particular success. In contrast, JHSC members report great problems in affecting attitudes and concerns about health and safety in the workforce and among management in general. Since general attitudes and concerns with health and safety are identified as important facilitators of success (Chapters 11 to 14), this finding will warrant further comment in later sections of the report.

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*With management estimates of poor performance being lower at about 9%, and worker estimates being higher, at about 16%.

DISPLAY 7.1

COMMITTEE MEMBERS' ASSESSMENTS OF JHSC IMPACT

Survey Question/Choices	Management Members	Worker Members	
Overall record in improving safety and reducing accidents:			W281/ M281
Poor to less than adequate	9.2%	11.0%	
Adequate	34.7	29.6	
More than adequate to excellent	56.2	59.4	
Overall record in reducing potential health hazards:			W282/ M282
Poor to less than adequate	5.4%	12.6%	
Adequate	34.2	28.6	
More than adequate to excellent	60.3	58.9	
Ability to obtain necessary changes in equipment, materials and work practices to improve health and safety:			W283/ M283
Poor to less than adequate	5.3%	16.0%	
Adequate	26.1	24.3	
More than adequate to excellent	68.6	59.6	
Ability to improve health and safety knowledge and concern among workers:			W284/ M284
Poor to less than adequate	14.8%	21.1%	
Adequate	28.4	30.9	
More than adequate to excellent	56.8	47.9	
Ability to improve health and safety knowledge and concern among management, including supervisory staff:			W285/ M285
Poor to less than adequate	10.7%	24.9%	
Adequate	30.1	28.8	
More than adequate to excellent	59.2	46.2	
Rating of success of inspections:			M117/ W117
Poor to less than adequate	7.1%	7.9%	
Adequate	26.4	24.5	
More than adequate to excellent	66.5	67.6	

7.2 PERCEIVED IMPACT ON DANGER IN THE WORKPLACE, AND WORKPLACE ATTITUDES

Overall, successful impact of JHSCs is especially suggested by reports on perceived reduction of danger in the workplace in the past 5 years (Display 7.2, below). In all areas, management and worker members report substantial improvement in health and safety in the past 5 years.

While we cannot conclusively determine the causality for this perception, it seems reasonable to assume that these types of changes may, in great part, be a result of the 1978 Act, and the widespread establishment of JHSCs which followed.

DISPLAY 7.2

PERCEIVED CHANGES IN LEVEL OF DANGER OVER 5 YEARS

Survey Question/Choices	Management Members	Worker Members	
Rating of danger from accidents in the workplace (now as compared to 5 years ago)			W286/ M286
Worse now	1.4%	4.8%	
Unchanged	16.6	17.5	
Better now	81.9	77.6	
Rating of danger from health hazards in the workplace (now as compared to 5 years ago)			W287/ M287
Worse now	0.9%	5.4%	
Unchanged	19.9	19.9	
Better now	79.9	81.2	
Rating of management and worker understanding of, and concern for, health and safety (now as compared to 5 years ago)			W288/ M288
Worse now	0.7%	2.6%	
Unchanged	9.9	16.1	
Better now	89.3	81.2	

7.3 OVERALL EVALUATIONS: A SUMMARY VIEW

7.3.1 Committees That "Work", Committees That Don't

JHSC members were asked to provide an overall evaluation of how well JHSC's were working to improve protection and safety of workers.

These results (Display 7.3) were highly consistent with the more specific evaluations above. Most importantly:

1. Management and worker members express similar views, that the majority of JHSCs (57.3% to 61.7%) are working well or extremely well.
2. Of the total, nearly a third of JHSCs (29.1% to 32.2%), are regarded as performing adequately.
3. A small minority of JHSCs (6% to 13.5%) are identified as not working effectively.
4. In relative terms, worker and management members' reports on the percentage of JHSCs that are not working are quite different. Management members indicate in their summary evaluation that about 6% of JHSCs are "not working", and workers evaluate 13.5% as "not working".

These evaluations were generally very similar to those obtained in Section 7.1.

DISPLAY 7.3
OVERALL EVALUATIONS

Survey Question/Choices	Management Members	Worker Members	
In your opinion, is your JHSC working, or not working in improving the protection and safety of workers?			W292/ M292
JHSC works extremely well	10.5%	12.5%	
JHSC working well	51.2	44.8	
JHSC working adequately	32.2	29.1	
JHSC not working effectively	5.7	12.6	
JHSC cannot function at all	0.3	0.9	

7.3.2 Matching Worker and Management Assessments

To better understand the views of worker and management members regarding success of JHSCs, we examined matched reports of worker and management members, for workplaces where questionnaires had been received from both sides of the committees. (This represented about 1,500 committees). Our concern was to see whether the view of success suggested above was in fact shared by workers and managers.

The results (Display 7.4, below) suggest that views of success are far less than fully shared. Of all of the JHSCs considered in the analysis, only 39% are regarded as working well by both mangement and worker sides. A substantial portion, 31.8% of JHSCs were committees where either workers or managers rate committee success as good, but the other side rates performance as adequate only.

More importantly a small, but perhaps critical minority of workplaces are characterized by wide differences between management members and worker members. In these workplaces, one side rates the JHSC as working well, or perhaps adequately, while the other side rates the performance of the JHSC poorly. About half of all JHSCs exhibited such variable evaluations, where in effect management and workers view success differently.

DISPLAY 7.4
OVERALL EVALUATIONS
MATCHED FOR MANAGEMENT AND WORKER MEMBERS

	WORKER MEMBERS' ASSESSMENTS		
MANAGEMENT MEMBERS' ASSESSMENTS	Committee is Not Working	Committee is Adequate	Committee Works Well
Committee works well	7.0%*	17.3%	39.0%
Committee is adequate	5.0	11.0	14.5
Committee is not working	2.0	2.4	2.1

* Shows total percentage of all workplaces, ie. total for display is 100%.

Generally, these differences tend towards workers having a more negative view of success. This was especially the situation for extreme cases, such as the 7% of workplaces where managers rate success of the JHSC very high while worker members rate success very low. But a number of differences were also found in the other direction, with workers rating their JHSC highly while managers rate success less highly, or as very poor.

Overall, these results were seen by the researchers as suggesting a "fragile" or partial success of many JHSCs, where success would be tentative either because:

- Only one side sees the JHSC as successful because of the actual committee process (these might be JHSCs where the committee process is more competitive, e.g. one side wins issues, and the other is seen as losing); and
- Dissatisfaction may be poorly communicated by the side which is dissatisfied.

These findings caution us generally, about the ratings of success of committees. Successes of JHSCs are apparently very common, consistent with our view that in general, great progress has been made in establishment of JHSCs. But for many committees the progress may have "shallow roots". Difficult issues may come before these committees in the future, and these results suggest that they need to be strengthened if they are to deal effectively with such issues.

7.3.3 Discussion

Members of JHSCs tend to evaluate the overall performance of their committees favourably. But a clear area for improving and strengthening committees seems evident in the 30% or so of JHSCs which are performing only "adequately", and in the very small percentage of committees (6% to 13.5%) that are regarded as "not working".

Further, evidence of the relatively successful operation of most JHSCs as perceived by JHSC members must be interpreted with caution on three grounds:

1. Lack of a high level of management-worker agreement on success of committees suggests that progress of many committees may be fragile or partial. Since a number of features we have examined, including training and communications, suggest that many JHSCs are weak in skills, and weak in support throughout the workplace, we conclude that such committees are at risk of quickly falling to the "does not work" category when faced with new or difficult issues.

   This highlights the importance of steps to strengthen committees (Chapters 9 to 16, to follow).

2. As we will note in Chapter 8, there are a substantial number of workplaces where JHSCs or management are not in compliance with basic provisions of the Act. These failures to comply with the law have an important negative effect on functioning of JHSCs, as will be demonstrated in Chapters 11 to 14 of this report (which deal with the factors that make JHSCs successful).

3. In Chapters 12 to 14 of the report, we will demonstrate that JHSCs tend to be regarded as less effective in the most dangerous workplaces. Accordingly, the impact of "poor" JHSCs may be significant beyond their numbers.

8. OVERALL COMPLIANCE WITH LEGISLATION

Earlier in this report, in Chapters 3 to 7, we examined various aspects of committee functioning, including a number of features relating to requirements of the Act. Several aspects of committee functioning are examined here to assess more specifically, the extent to which the Occupational Health and Safety Act is complied with.

8.1 SPECIFIC ASPECTS OF NON-COMPLIANCE

Results point to a number of major and minor areas of non-compliance with the Act. Perhaps the most important of these are:

1. A small but significant minority of workplaces do not have JHSCs at all (about 7%), although required by the Act.
2. Management is reported to appoint worker representatives or otherwise supervise selection of worker representatives in a substantial number of workplaces (35.2%).
3. Significant deviations from the Act are evidenced in treatment of investigations of work refusals, critical injuries/fatalities, and of designated substances (the reader is reminded that workplaces requiring this type of treatment are a minority of the total population).*

As well, a variety of "other non-compliances" add to the picture of relatively loose response to the requirements of the Act: about 20% of workplaces fail to post names of workers, take minutes regularly, or pay workers for all hours spent on JHSC business. About 6% of workplaces do not comply with the requirement that half or more of JHSC members should be workers, so that on these committees, management are in the majority.

The conclusion, of course, is that **non-compliance with specific elements of the Act is substantial and covers all features of the Act, including a number of those which are extremely important to health and safety** (e.g. designated substance requirements).

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*As was noted earlier *(Section 5.5.1)*, work refusals are reported to occur in about 11% to 16% of all workplaces; critical injuries occur in 10% to 20% of workplaces (see *Section 5.5.1)*.

DISPLAY 8.1

COMPLIANCE/NON-COMPLIANCE WITH PROCEDURAL FEATURES OF THE ACT

(Upper case answers indicate requirement of the Act)

Survey Question/Choices	Management Members	Worker Members	
Is a JHSC in operation?	*	***	
YES	92.9%		
No	7.1		
How are worker members selected?			W032
SELECTED/DESIGNATED BY WORKERS OR UNION	**	64.8%	
Appointed/accepted by management		35.2	
Do workers constitute 50% or more of the members?			
YES	93.8****	93.8%****	
No	6.2	6.2	
Are names of JHSC members posted or publicized where every worker can easily see them?			W033
YES	**	77.0%	
No		23.0	
How many times has your JHSC met in the past 12 months?			W069
FOUR OR MORE TIMES		83.3%	
Less than four times		16.7	
How often does the JHSC take written minutes of meetings?			W084
ALWAYS	**	81.5%	
Not Always		18.5	
Are workers paid for all hours spent on JHSC business?			W092
ALL	**	80.8%	
Not all		19.2	

*From management responses to the screening survey.

**Not asked for management members.

***Not asked for worker members.

****Combines management responses to the screener survey with responses from worker members.

DISPLAY 8.2
COMPLIANCE/NON-COMPLIANCE WITH INFORMATION/INVESTIGATION FEATURES OF THE ACT

(Upper case answers indicate requirement of the Act)

Survey Question/Choices	Management Members	Worker Members	
How often did a worker JHSC member (or worker representative) participate in the investigation of work refusal(s)?			W119/ M119
ALWAYS	81.5%	56.5%	
Not Always	18.5	43.5	
In the past 12 months, how often was your JHSC informed of the above critical injuries/fatalities?			W125/ M125
ALWAYS	95.8%	58.2%	
Not Always	4.2	41.8	
In the past 12 months, how often did a worker JHSC member take part in the investigation of the above critical injuries/fatalities?			W126/ M126
ALWAYS	75.0%	42.8%	
Not Always	25.0	57.2	

DISPLAY 8.3
COMPLIANCE/NON-COMPLIANCE WITH FEATURES OF THE ACT RELATED TO DESIGNATED SUBSTANCES

(Upper case answers indicate requirement of the Act)

Survey Question/Choices	Management Members	Worker Members	
Has an assessment been conducted for each of the designated substances present in the workplace?*			W148/ M148
YES, FOR ALL	71.3%	58.4%	
Not for all	28.7	41.6	
Did management consult your JHSC in the assessment(s)?*			W149/ M149
YES, FOR ALL	74.3%	60.4%	
Not for all	25.7	39.6	
Did each member of your JHSC receive a copy of the assessment(s)?*			W150/ M150
YES, FOR ALL	68.1%	50.5%	
Not for all	31.9	49.5	

* These estimates for workplaces with designated substances only.

8.2 OVERALL COMPLIANCE/NON-COMPLIANCE

To measure non-compliance more generally, an indicator was developed which counted the number of specific instances of non-compliance for each aspect of the Act as noted in Displays 8.1 to 8.3.

In Display 8.4 (next page), we examine the distribution of non-compliance to ascertain if the wide range of non-compliance evidenced is the result of a small number of "hard core" non-compliers, or the result instead of widespread partial compliance.

DISPLAY 8.4

OVERALL PATTERN OF COMPLIANCE/NON-COMPLIANCE

(Indicator based on worker's reports)

Survey Question/Choices	Workplaces With No Designated Substances**	Workplaces With Designated Substances**	All Workplaces
Compliance/non-compliance among workplaces with committees			
Full compliance	23.1%	18.2%	21.7%
Non-compliance on 1 aspect*	29.5	22.4	27.5
Non-compliance on 2 aspects	22.9	23.7	23.1
Non-compliance on 3 aspects	11.9	16.8	13.3
Non-compliance on 4 aspects	8.9	9.0	8.9
Non-compliance on 5 or more aspects	3.7	9.9	5.5
Total	100.0%	100.0%	100.0%
No committees			
Full non-compliance	8.4	2.4	

* Aspects of compliance are items examined in Displays 8.1 to 8.3

** According to Ministry definition of presence of designated substances.

The results shown in Display 8.4 indicate that non-compliance is widespread indeed. According to our survey results, only about 22% of workplaces with JHSCs are in full compliance with the Act in Summer-Fall, 1985. Most firms comply fully with most features of the Act, but few are in full compliance.

8.3 DISCUSSION AND CONCLUSION

These areas of compliance represent an important area where management and worker members differ greatly in their view of what has been done in the JHSC. For example, 81.5% of managers report that worker members of JHSCs always investigate work refusals, as compared to only 56.5% of worker members reporting the same. Similarly, management and worker members differ greatly on every aspect of investigations and designated substances which relates directly to the Act. These results suggest great confusion among workers and management members as to what the Act means, and what it requires, and such confusion certainly calls for clarification.

Yet the overall pattern, even allowing for the most positive assessment (usually by management), is for the Act to be complied with in detail only 75 to 85% of the time, on any of the identified compliance features. Certain of these aspects of non-compliance (e.g. those related to designated substances and investigations) are of special importance. **Many of the procedural features not complied with are, as we note in Chapters 11 to 14, detrimental to effective operation of JHSCs.** Generally, only about 22% of firms with JHSCs appear to be in full compliance with the Act.

Together, these results indicate that technical non-compliance with the Act is widespread. The issue of how this non-compliance might be remedied is addressed in the concluding section of this report, where some suggestions are made.

9. ASSESSMENTS OF NEEDS

9.1 FIRST PRIORITIES: SUPPORT FROM WORKERS IN GENERAL, AND TRAINING

9.1.1 Worker Member and Management Member Agreement on These Priorities

When asked to identify things that would help their JHSCs to function more effectively, worker and management members alike placed "more input and support from workers" and "more training on health and safety matters" at the top of the list. These results are shown in Display 9.1 (to follow).

More input from workers in general was identified as something that would help the JHSC, by 75.4% of management members. More training on safety issues was similarly identified as a high priority (78.9% of management members said it would help their JHSC), as well as more training on health issues (74.6% said it would help the JHSC).

Workers identify the same three concerns as most important to making the JHSC work better. Worker members of 79.3% of the JHSCs indicate that training on safety issues would help and 77.6% indicate that training on health issues would help the JHSC. Similar emphasis is given to improved support from workers in general; worker members of 77.1% of JHSCs indicate that more input from workers in general would help the JHSC.

9.1.2 The Critical Role of Input From Workers in General

Input from workers in general emerges as a significant issue in the overall study results, and particularly regarding the "needs of JHSCs" as seen by members.

This might have been predicted from earlier findings on the role of workers. We had noted in Chapter 4 that the role of workers in selection of JHSC members is restricted, especially in non-unionized establishments, since management appoints or approves many worker members of JHSCs. As well, we have noted that mechanisms for JHSCs to report to workers are uneven, with many JHSCs (especially in the non-unionized sector) not reporting to workers at all.

Perhaps most importantly, our examination of the workplace environment (Section 3.4.3) noted that workers and management at a substantial minority of workplaces are reported to have less than adequate to poor levels of understanding of both the Occupational Health and Safety Act, and safety/health hazards.

Previous research had suggested that management's attitude towards health and safety was critical to success of health and safety committees (e.g. Kochan, 1977). Here, the evidence suggests that the broader network of attitudes in the workplace is critical to success of JHSCs, and that attitudes of the workforce generally are a critical element in this equation. These results are highly consistent with Ham's assessment of the broad role of all parties in the workplace. Further below, in Chapter 12 of the report, we will see that these attitudes are apparently important facilitators of success of JHSCs.

9.1.3 Training as a Central Need

Low levels of training were noted earlier in the report, when we observed that specific types of training are widely lacking (Section 4.1.2), and that many JHSC members have no training at all in health and safety matters. That situation was noted for management members of 19.4% of all JHSCs, and for worker members of 38.8% of JHSCs.

It is no great surprise then, that training is identified by members as a major need for JHSCs. As will be shown in Chapter 12 of this report, training also appears to be an important facilitator of functioning of JHSCs.

9.1.4 Other Needs: Information, and Management Input

After increased training and more support from workers generally, increased management support and better information are identified as main needs by worker and management members. Management members (62.9%) and worker members (72.4%) both indicate need for greater information and more management support (62.5% management members, and 66.3% worker members).

9.1.5 Management and Worker Member Differences

Management and workers differ systematically in their level of need indicated. On each of 19 areas examined, more workers indicate that more help would aid the JHSC a lot. This represents in our assessment, a strong statement by worker JHSC members to the effect that JHSCs need improvement and upgrading to work effectively. That management needs indicated are far less, may suggest that the system tends to works more to management's satisfaction, or perhaps that management believes the system, as it exists, is not amenable to significant change.

Some specific differences are of particular interest. Worker members differ from management members in indicating that important needs of JHSCs lie in the areas of: more help/advice from the Ministry of Labour (61.9%); better outside experts (59.1%); more support from management to pay for recommendations (58.0%); better inspection procedures (57.0%); greater authority/independence for the JHSC (indicated as a need by worker representatives for 56.2% of JHSCs); and stronger enforcement by the Ministry of Labour (indicated as a need by worker representatives on 52.8% of JHSCs). As we will see in Chapter 12 of the report, both a perceived decision-making role for the JHSC, and greater activity by the Ministry of Labour appear to make important contributions to committee success.

DISPLAY 9.1

COMMITTEE MEMBERS' ASSESSMENTS OF AREAS OF COMMITTEE FUNCTIONING IN NEED OF IMPROVEMENT

Survey Question/Choices	Management Members	Worker Members	
To what extent would the following things improve your JHSC, to make it work better? (total % indicating "would help")			W293 TO W311/ M293 TO M311
More representation on JHSC from management	26.3%	29.1%	
More representation from workers	31.1	44.0	
More support/input from workers generally	75.4	77.1	
More support/input from management generally	62.5	66.3	
More regular and frequent meetings	23.5	41.9	
Better JHSC procedures (written agenda, minutes, etc.)	29.4	36.5	
More training on safety issues	78.9	79.3	
More training on health issues	74.6	77.6	
More time to study technical information	53.2	62.7	
Better inspection procedures	46.5	57.0	
More or better in-house health and safety staff	44.1	52.1	
More or better outside experts/advisors	49.1	59.1	
More information on health and safety matters	62.9	72.4	
More authority/independence for JHSC	31.6	56.2	
More support by management to pay for recommendations	36.8	58.0	
Stronger enforcement of legislation by Ministry of Labour	25.2	52.8	
More help/advice from Ministry of Labour	45.1	61.9	
Better labour/management relations	34.3	49.2	
Better working relationships between worker and management JHSC members	28.2	50.3	

10. SUMMARY OF DESCRIPTIVE SURVEY RESULTS

A number of important conclusions emerge from the descriptive survey results. Most of these are supported by both management and worker member data. These results point both to significant accomplishments since 1978 in establishing JHSCs, and to significant need for strengthening of committees, as a noteworthy portion of JHSCs appear to be weak or ineffective.

10.1 ESTABLISHMENT OF COMMITTEES

The study results indicate that JHSCs are established in most workplaces in Ontario where required, that is in over 90% of workplaces with 20 or more workers (see Chapter 3, above). These results lead us to conclude that it is highly feasible to establish JHSCs on an essentially universal basis in Ontario industrial, mining, health and educational establishments. Such an extension of JHSCs represents an important accomplishment of the 1978 Act.

One significant deviation from this pattern is in the area of committee establishment in very small workplaces with less than 20 workers, where designated substances are present. Our results for these workplaces show a very different pattern, with survey results indicating establishment of committees in only 66.3% of workplaces identified as covered by this feature of the legislation.

10.2 JHSC FUNCTIONING

Most of the JHSCs in operation appear to be functioning generally as they are supposed to. They are having meetings, getting information, conducting inspections and investigations, acting on designated substances, and making recommendations. But problems exist for a substantial number of JHSCs:

1. Serious problems appear to exist in the communications process around JHSCs. JHSCs appear to be poorly linked with the workforce in most workplaces, and also poorly linked to management in many workplaces. In such workplaces, the existence of the JHSC may be deceptive as an indicator of effective internal responsibility.

2. In many workplaces, JHSCs face low levels of understanding and support from the workforce.

This non-involvement is reflected widely in reports of management and worker members of JHSCs. This problem appears to be correlated with the above lack of communication or process. In a very substantial minority of JHSCs, it is reflected in management appointment or promotion of volunteers from workers to join the JHSC, so that in fact, workers in those workplaces do not select their own representatives.

3. Worker members of JHSCs are reported to have fewer resources to aid in problem-solving as compared to management members. This was shown on a number of key dimensions including: training; information; and apparently, contacts with Ministry inspectors. Because their resources appear to be far less adequate compared to those of management, workers are less able to make full contributions to the JHSCs.

4. The results suggest a need for clarification of requirements of the Act regarding investigations. Actual conduct of investigations seems to be far less than that required by the Act, so that this is a major area of concern.

5. The evidence suggests that considerable problems occur in the area of designated substances and programs to control the hazard potential of these substances (at least as of Summer-Fall, 1985). These problems include some uncertainties about what substances are present to begin with, and only partial implementation of assessments and control programs.

10.3 COMPLIANCE WITH THE ACT

From the survey results, we have estimated that about 7% of Ontario workplaces with 20 or more workers which should have JHSCs, do not. (And non-compliance is very high, (about 33%) among workplaces with designated substances and less than 20 workers.)

Among workplaces with JHSCs, compliance with specific provisions of the Act is poor: only some 22% of workplaces with JHSCs appear to be in full compliance with the Act.

Overall, compliance with the Act is very incomplete. Improved education and better enforcement suggest themselves as important to future action.

10.4 PERCEIVED SUCCESS/IMPACT OF JHSCS

A majority JHSCs are regarded as successful by worker members, and/or management members. However, members do not always agree on success. In a substantial portion of workplaces, the JHSC is seen as successful by workers, but not managers, or vice-versa. Several considerations lead us to see this as reflecting underlying weaknesses in many JHSCs. Such JHSCs are hypothesized to be those:

- Where communication is poor, where perhaps one side believes the process is working well, but the other (privately) feels that the committee is failing.
- Where the committee is an arena for conflict, or where by perception, one side is perceived as the "winner" on most issues.

These results do not diminish the success of most JHSCs, but they warn us that where success is reported, it is often partial or fragile.

While most JHSCs are regarded by their members as successful, a substantial minority of committees are seen to have problems. The survey results suggest that workplaces might be roughly classified as follows:

JHSCs that are generally functioning well	58%
JHSCs that are functioning adequately only	30%
JHSCs that are functioning poorly or not at all	12%

Considering the various problems noted above, such as uneven functioning of JHSCs, areas of disagreement between management and worker members, and non-compliance with specific requirements of the Act, the experiment with JHSCs must be regarded as only a partial success. Gains with JHSCs since 1978 appear to be impressive, but much in need of consolidation and upgrading.

10.5 NEEDS OF JHSCS

Significant needs of JHSCs are identified by workers and management members. Generally managers and workers agree that more support from workers, more training and more information are high priority needs of JHSCs. Workers place additional emphasis on the need for more time to study technical issues; more help/advice from the Ministry of Labour; and expanded authority for the JHSC.

10.6 ROLE OF THE MINISTRY

Several important findings emerged regarding the Ministry and particularly regarding variability in the role of the Ministry inspectors. The inspector's role seems to be variable on two points:

1. JHSC members' reports indicate that inspectors vary greatly in their pursuit of the facilitator role outlined by the Ministry Operations Manuals; and
2. The data suggest very strongly that Ministry inspectors have more regular contacts with management members of JHSCs rather than with worker members (indicated by comparison of management and worker member reports). Of these, variability of the inspector's role seems particularly important.

As well, the surveys reveal indications that Ministry data on workplaces may be incomplete, particularly as regards the presence of designated substances: this proposition is rooted in reports by a large number of JHSC members, that designated substances are present in workplaces identified by the Ministry as having no designated substances.

A broader evaluation of the Ministry's inspection program is recommended in Chapter 16 of this report, on three grounds: (1) the Ministry's impact appears to be variable; (2) the Ministry's role as facilitator appears to be important to the success of JHSCs (this importance will be clearly demonstrated in Chapter 12 of the report); and (3) because there are some questions about the accuracy of Ministry information on designated substances.

10.7 CONCLUSIONS

In general, the establishment of JHSCs in Ontario appears to be an experiment which is by and large succeeding. JHSCs are widely established, and worker and management members alike report significant success. In addition, we think that responses of JHSC members to the surveys reflect a clear capacity for self-evaluation.

However, weakness in enforcement and facilitation by the Ministry, and disorganization in the response of management and labour alike, is clearly indicated by the evidence of partial awareness of requirements of the Act, and the very partial compliance. As well, major needs are indicated for training, information and other improvements for JHSCs to be effective.

These results suggest a considerable need for reorganizing and "re-energizing" the experiment with JHSCs. In Part III (to follow) we will identify a number of avenues to such an extension of the JHSC experiment.

PART III:

WHAT AFFECTS OPERATION, FUNCTIONING AND SUCCESS OF JHSCs

11. FACTORS AFFECTING JHSCS' INSTITUTIONALIZATION/ FUNCTIONING

11.1 OBJECTIVES OF THE REGRESSION ANALYSIS

A key question posed for the study was: "what makes joint health and safety committees work -- what makes them more successful?" This question was seen to be of great importance for two reasons. First, experience with JHSCs is limited -- it was hoped that the study would offer insights into what makes committees work better, so that practitioners could use this information to improve their committees. Second, it was anticipated that an analysis to demonstrate which features of committees appear to contribute to their success would be important knowledge for policy making on the part of the Ministry of Labour.

Since, as was shown in Chapters 3 through 10, a substantial number of JHSCs are operating with only partial compliance with the Act, and only partial effectiveness, these concerns are significant. Most JHSCs could improve their performance substantially, and a significant minority of JHSCs are in serious need of change.

11.1.1 Approach to the Analysis

We approached the analysis of factors affecting JHSCs at two levels:

1. Recognizing that findings would be of significance to policy makers.
2. Drawing from a "young" but growing body of literature and a formal model of JHSC functioning (see Section 1.3).

Actual tests focused on regression analyses to predict two main dimensions of JHSCs:

1. JHSC functioning: the extent to which JHSCs are established, institutionalized and working, with routine processes, and completing basic functions.
2. Perceived JHSC impact: the extent to which JHSCs are seen by their members as being successful and having a positive impact on health and safety.

11.1.2 Reliance on Multiple Regression: A Brief Introduction to the Method

For each dimension of JHSCs examined, several indicators of JHSC functioning and impact were examined using multiple regression analysis. The use of this technique to identify factors which facilitate JHSCs will be briefly explained here.

Multiple regression is a statistical technique which attempts to explain a given phenomenon by looking at its correlation with a number of characteristics simultaneously. This is as opposed to simple cross-tabulations (tables) which allow only one or two variables to be considered at a time, or simple correlations between pairs of variables.

To over-simplify, including any variable (call it "X") in a multiple regression procedure asks the following question: holding other things constant, is variation in X associated in some way with changes in the particular outcome measure being predicted.

Multiple regression tells us how important any such association is, and whether that association is statistically significant (even in relatively large samples, some correlation may occur by chance: statistical analysis lets us isolate those relationships that are very likely not due to chance, and we report results where the odds of being a chance finding are less than one in twenty, with special attention to results that are due to chance with odds of less than one in a hundred).

To illustrate, we conducted a regression analysis to predict perceived frequency of Ministry inspections. We attempted to predict perceived frequency from two of our variables: whether the workplace is unionized or not, and workplace size.

Both variables in this "model" were statistically significant predictors of frequency of Ministry inspection. Inspections are more frequent for larger and also for unionized workplaces. This means that each variable has a significant impact, when the other is controlled for. For example, if we looked only at unionized workplaces, or only at non-unionized workplaces, we would find inspections to be more frequent among large workplaces; if we looked only at workplaces of similar size (say small workplaces), we would find the small unionized workplaces to be more frequently inspected than small non-unionized workplaces.

Our presentation of regression results in this and the following chapters is non-technical, but detailed statistical results are provided in Appendix B. That appendix also contains evaluations of technical features of the regressions, including total variance accounted for, and a cross-validation of the regression-based models, using another multi-variate technique -- discriminant analysis.

11.1.3 Causal Inferences

Statistical relationships identified using multiple regression or any statistical technique do not necessarily demonstrate causation, although in some cases relationships are strongly suggestive of causation. By causation we mean that in the real world, change in one variable will cause change in another.

For example, as will be reported below, we found a strong positive relationship, for both worker and management member analyses, between the labour relations climate in the firm and the outcome indicator positive relationships among JHSC members. The obvious (and we believe correct) inference is that when things in general, are going well between labour and management in a firm, this will carry over into the JHSC, and positive committee relationships will follow.

However, even where we are fairly confident about the direction of causation, two-way causation may be possible. For instance, in the above example, we have some reasons (based on committee members' reports) to believe that very positive experiences in a JHSC may in time have a positive effect on labour relations. (In fact, our analysis indicates that nearly half of JHSC members think that the work of the JHSC improves labour relations.)

11.1.4 Reliance on Subjective Indicators of Impact

The reader is reminded that the analysis of success/impact of JHSCs focuses upon subjective indicators of outcomes, (i.e. self-reports of committee members) and not actual indicators of health and safety outcome (e.g. historical accident or health disability statistics). This design decision centred on the study steering committee's view that accurate and comprehensive statistics do not exist at the workplace level at this time.

These subjective indicators are by no means trivial. They represent the combined judgement of thousands of individuals who have assumed front-line roles in health and safety, through their work on workplace JHSCs. Even so, validation of results with fully objective indicators is an important topic for future research (see Chapter 17).

11.1.5 Explanatory and Policy Relevant Variables

In any analysis, say of the relation between labour relations climate and JHSC success, the question arises as to whether our result is only explanatory (helps us to understand), or policy relevant (the variables can be manipulated for policy purposes).

Whether good labour relations are caused by other factors, or whether labour relations affect operation of JHSCs, is to a great extent a moot point unless we are able to manipulate labour relations climate or learn something else from the analysis. On a policy level it is difficult to improve labour relations in individual workplaces, but it is certainly useful to understand the sensitivity of JHSCs to the labour relations environment.

More important than explaining the success of committees, is the attempt to find "handles" for improving the functioning and impact of JHSCs. Accordingly, the regressions include not only explanatory variables, but numerous policy relevant variables which could be manipulated by government and others in an effort to improve the workings of JHSCs.

With this in mind, our regression relied on a substantial range of potential predictors. These are all reported in Appendix B. The following Chapters 11 to 13 highlight the strong relationships we obtained for each problem area examined, and key implications for policy.

11.2 FOUR ASPECTS OF JHSC INSTITUTIONALIZATION/FUNCTIONING

Our analysis examined four aspects of JHSC functioning: (1) institutionalization of the JHSC process, reflected in such ways as the JHSC having regular meetings, taking minutes, and formal communications; (2) frequency of workplace inspections; (3) action on designated substances (only for workplaces with designated substances); and (4) positive committee relationships (worker and management members' tendency to regard the other side as cooperative, trusting and friendly). These were seen as central elements in the development of an effective JHSC.

All four indicators were tested using both worker and management member data with the following criteria: the criterion for treatment as an important facilitator is a significant regression coefficient for the variable or indicator tested (at P = .05* or better). Emphasis is also placed on those factors significant in both management and worker questionnaires (except for variables appearing on only one of the questionnaires and thus in only one regression).

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*"P" indicates the "probability level" for a regression coefficient, e.g. the probability that the coefficients result by chance. At P = .05, there is a 95% probability that the results do not emerge by chance alone.

11.2.1 Institutionalization of JHSC Process

Institutionalization was expected to be important as an indicator of how well established JHSCs are. If JHSCs are not well established, meeting regularly, organizing their work, complying with organizational features of the Act, and communicating within the workplace, then both logic and previous research leads us to expect JHSCs to be ineffective. We examined the explanatory factors that might predict a composite indicator of these aspects of institutionalization.

The Indicator of Institutionalization

The composite indicator JHSC institutionalization includes measures of whether meetings are regularly scheduled, whether there is a formal agenda, whether inspection reports are circulated, whether minutes are kept, approved, and circulated among those not on the JHSC, and so on. (See *Appendix B* for a detailed list of indicators and their components.)

The Result

Our regressions indicate that the JHSC process tends to be more institutionalized (note each point reflects a significant result with more important predictors listed first):

- When the firm has a strong health and safety program.
- When there are stronger linkages between the JHSC and the Ministry (when the JHSC sees Ministry reports and orders and participates in Ministry inspections).
- When the Ministry inspector is proactive (reviews minutes, provides referrals, gives advice, follows up orders, discusses results).
- When JHSC members are well-trained and knowledgeable about health and safety.
- When worker members have good information about health and safety.
- When the firm is unionized.
- When mid-level management serves on the JHSC.
- When the workplace is perceived to be dangerous.
- When the JHSC has written terms of reference.
- When the workplace is part of an international (multi-national) organization.

Discussion

These findings are consistent in certain respects with previous research findings on joint health and safety committees, particularly: findings regarding the role of external authority (Kochan et al, 1977), which correspond to the findings here, regarding a more active role for the Ministry of Labour; findings on the impact of danger (Beaumont, 1982, page 96); and international scope of firm (Beaumont, 1983).

Some findings (e.g. positive effects of existing health and safety programs, positive effects of unionization) appear to represent an extension of our understanding.

11.2.2 Frequency of Workplace Inspections by JHSC Worker Members

Workplace inspections by the JHSC worker members were examined as a central feature of effective JHSC functioning (Ham, 1976), for example, placed great emphasis on the inspection process).

The Indicator

The indicator examined was a question asked of both worker and management members: "... about how often does a worker member of your JHSC undertake health and safety inspections of the workplace?... once a week or more often... once a month... once every two months... three months... six months... twelve months?

The Result

We found that inspections by JHSC worker members are more frequent when:

- Workers and managers in general have more training and knowledge about the Act and about safety and hazards.
- JHSCs tend to represent all buildings, departments, and/or locations within the company.
- The JHSC is "older" (e.g. established before the 1978 Act).
- The Ministry carries out more frequent inspections.

- There are more linkages between the JHSC and the Ministry (such as JHSC review of orders, and JHSC participation in Ministry inspections).
- Firms are larger.
- Firms are private sector.

Discussion

These results reaffirm the importance of health and safety training and education. They also suggest one very important impact which Ministry inspections appear to have -- in accelerating JHSC inspections. Finally, these results show a positive effect of JHSC structures in complex workplaces including representatives from all buildings, areas, etc.

11.2.3 Action on Designated Substances

Treatment of designated substances has special importance within the Act, and great significance for health and safety.

Action on designated substances was dealt with in a separate regression analysis and only for those workplaces with designated substances.

The Indicator

Our indicator of Action on Designated Substances was comprised of eight questions dealing with response to designated substances, indicating whether action had been taken at all to deal with designated substances, and if so, whether for all or some of the designated substances present. (See *Appendix B* for details on the indicators.)

Results

As indicated by our regression analyses, JHSCs are found to take a wider range of action and more comprehensive action on designated substances, when:

- The Ministry inspector is proactive.
- A wide range of satisfactory information is available.

- The JHSC has written terms of reference.
- Management member health and safety orientation is high.
- Worker and management member training is high.

Discussion

Factors facilitating action on designated substances are, to a great extent, like other facilitators of JHSC functioning. It is interesting however, that the role of the Ministry inspector seems to be more important as regards designated substances.

11.2.4 Positive Committee Relationships

The Indicator

We examined factors related to the composite variable measuring positive relationships between management and worker members of JHSCs. Each group was asked to rate relationships on four criteria: cooperation, mutual respect, trust, and friendliness. (See *Appendix B*, for details.)

The Result

We found that relationships between worker and management JHSC members tend to be more positive when:

- There is a positive labour relations climate.
- Management (both in general and on the JHSC) is oriented to health and safety (knows the Act, understands hazards, contributes to the JHSC).
- Workers (both in general and on the JHSC) are less positively oriented to health and safety.
- Worker and management members are satisfied with the information they receive about health and safety.
- The committee is younger (more recently formed);
- Management members have authority to agree on recommendations made by the JHSC by themselves.

- Worker and management members receive health and safety training together.
- Management members have been on the JHSC for a longer length of time.

Discussion

The relationship of worker concerns with health and safety to positive committee relations raises a number of serious issues as regards the nature of cooperation required in JHSCs.

These data suggest that attempts to increase worker concern about health and safety may lead to reduced levels of cooperation and poorer personal relations on committees. Since both increased worker concern and cooperative committee relations improve perceived JHSC impact (see Chapter 12, to follow), important questions are raised about the type of worker concern, and the type of cooperative process which can be reconciled in an effective JHSC process.

It is also interesting that "younger" committees are found to have more positive committee relations. This may be because of the role of the 1978 Act in creating joint committees within a cooperative framework. Or it may be that older committees may exist in workplaces with more serious health and safety problems, where committees may have moved through early agreements to less tractable problems. This may simply suggest that many "younger" committees have not yet gotten to the more serious issues in health and safety.

11.3 OVERALL EVALUATION OF FACTORS INFLUENCING THE FUNCTIONING OF JHSCS

11.3.1 What Helps JHSCs to Function

In Display 11.1 (to follow), we show an evaluation of a wide range of factors derived from the above analyses, which are seen as facilitating functioning of JHSCs. Examining the arrows of Display 11.1 which identify major determinants of JHSC functioning, we can see that a few key factors appear to have systematic positive effects.

Key facilitators* include: management and worker members' health and safety training and orientations; health and safety orientations of management and workforce generally; written terms of reference for the JHSC; and (in unionized workplaces) regular reporting by worker members to the union.

Other key facilitators of functioning include: a proactive Ministry inspector; positive labour relations climate; satisfaction with information; and existence of a health and safety program in the workplace.

11.3.2 Discussion

In a general way, these findings seem highly consistent with the results of previous studies (e.g. Kochan, regarding attitudes of workers and management, and the role of external authority). As well, assuming logically acceptable causal relations, some important strategies for strengthening functioning of committees can be discerned from these results:

1. Educational and awareness programs for workers and management should improve support for JHSCs.
2. Increased training programs for JHSC members will support institutionalization of the JHSC process.
3. Expansion and strengthening of the proactive role of Ministry inspectors will strengthen JHSC functioning.

As we demonstrate in Chapter 12, these same types of strategies also promise improvement in JHSC success/impact.

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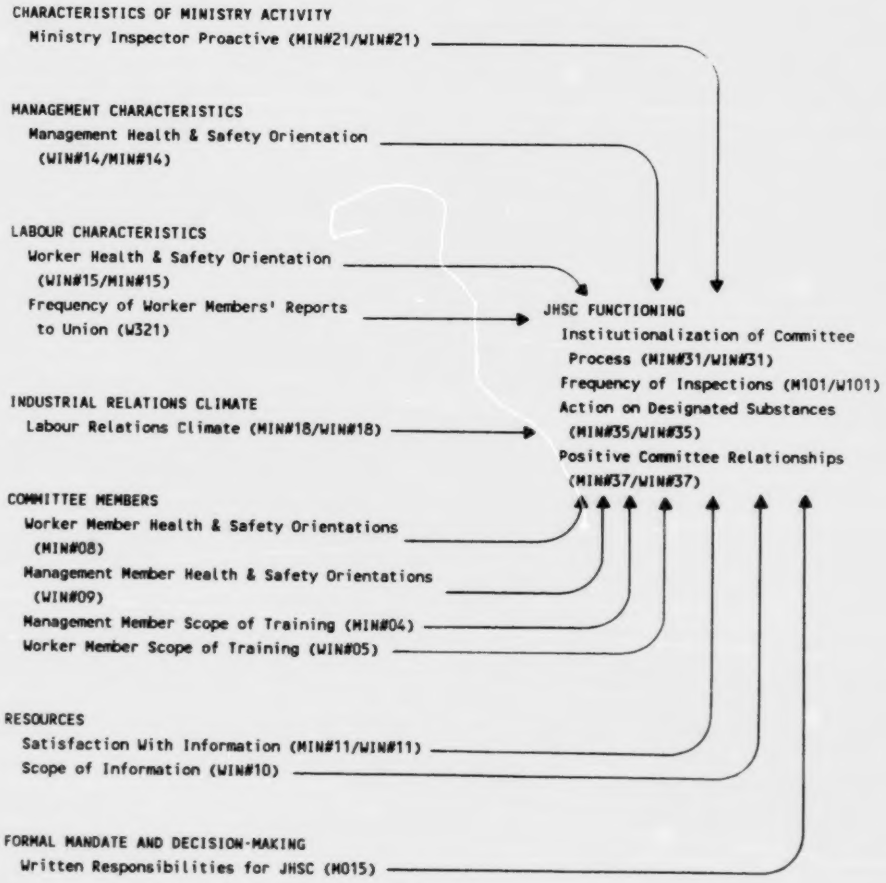
*This classification was based on the total number of regression coefficients statistically significant at $P = .05$ or better, as compared to the number of regressions each variable had been tested in. Predictors were classified as major predictors if more than half of possible coefficients were statistically significant at $P = .05$ or better.

DISPLAY 11.1
MODEL OF MAIN FACTORS INFLUENCING FUNCTIONING OF JOINT HEALTH AND SAFETY COMMITTEES
(Arrows show direction of effects for major determinants)


CHARACTERISTICS OF MINISTRY ACTIVITY
Ministry Inspector Proactive (MIN#21/WIN#21)
MANAGEMENT CHARACTERISTICS
Management Health & Safety Orientation (WIN#14/MIN#14)
LABOUR CHARACTERISTICS
Worker Health & Safety Orientation (WIN#15/MIN#15)
Frequency of Worker Members' Reports to Union (W321)
INDUSTRIAL RELATIONS CLIMATE
Labour Relations Climate (MIN#18/WIN#18)
COMMITTEE MEMBERS
Worker Member Health & Safety Orientations (MIN#08)
Management Member Health & Safety Orientations (WIN#09)
Management Member Scope of Training (MIN#04)
Worker Member Scope of Training (WIN#05)
RESOURCES
Satisfaction With Information (MIN#11/WIN#11)
Scope of Information (WIN#10)
FORMAL MANDATE AND DECISION-MAKING
Written Responsibilities for JHSC (M015)
JHSC FUNCTIONING
Institutionalization of Committee Process (MIN#31/WIN#31)
Frequency of Inspections (M101/W101)
Action on Designated Substances (MIN#35/WIN#35)
Positive Committee Relationships (MIN#37/WIN#37)

Other predictors of JHSC functioning included variables indicated in Display 11.2. These were variables which had one or more significant regression coefficients, but which failed to meet the criteria noted (see previous page) for identification as a major predictor of JHSC functioning.

DISPLAY 11.2
OTHER FACTORS INFLUENCING FUNCTIONING OF JOINT HEALTH AND SAFETY COMMITTEES

FIRM CHARACTERISTICS
- Health & Safety Program (MIN#16/W222)
- International Operation
- Canada-Wide Operation
- Size of Firm

MANAGEMENT CHARACTERISTICS
- Management Health & Safety/Labour Relations Overlap (MIN#26)

LABOUR CHARACTERISTICS
- Unionized or Not (M246/W246)
- Union Health & Safety Resources (WIN#22)

LEVEL OF DANGER
- Perceived Danger (MIN#20/WIN#20)
- Presence of Designated Substances (MIN#12/WIN#12)
- Presence of Other Hazards (MIN#13/WIN#13)

COMMITTEE STRUCTURE
- Committee Coverage (MIN#02)

COMMITTEE MEMBERS
- Age of Committee (CAGE)
- Mid-Level Management on JHSC (M027)
- Management Members Can Agree to Recommendations on Own (M165)
- Worker/Manager Training Combined (M060)
- Worker Members Average Length of Time on Committee (WAVE)
- Management Members Average Length of Time on Committee (MAVE)
- One Worker Only on JHSC

CHARACTERISTICS OF MINISTRY ACTIVITY
- Ministry Inspector Proactive (MIN#21/WIN#21)
- Frequency of Inspection (M264/W264)
- Ministry JHSC Linkages (MIN#21A/WIN#21A)
- Ministry Issued Orders in Past 12 Months (W267/M267)

12. FACTORS AFFECTING PERCEIVED SUCCESS/IMPACT OF JHSCS

12.1 FOUR ASPECTS OF PERCEIVED JHSC SUCCESS/IMPACT

Our analysis considered four basic indicators of JHSC success/impact: (1) perceived impact/ success in 5 areas; (2) perceived committee success with inspections; (3) perceived health and safety improvements in the past 5 years; and (4) overall evaluation of committees' success in protecting health and safety of workers.

Each of these is reviewed in turn, in a specific regression analysis. As with Chapter 11, separate regressions were conducted for management and worker members, with most variables measured for both groups, and (in general) report of significant results only when worker and management members analyses agree. At the end of Chapter 12, an overall evaluation is presented regarding factors which appear to be strongest facilitators of JHSC success.

12.1.1 Perceived JHSC Success/Impact as Regards Five Aspects of the Workplace

The Indicator

We examined five aspects of committee members' perception of JHSC success/ impact: perceived accident reduction; health hazard reduction; obtaining changes to improve health and safety; and improved worker and management education regarding health and safety. These were combined into a single composite variable by averaging respondents' ratings of JHSC success/impact in all five areas.

The Results

The regression results indicate that perceived impact is higher (significant coefficients reported, see *Appendix B* for details) when:

- Workers have a high level of understanding and concern for health and safety, and make contributions to the JHSC.
- Management has a high level of concern for health and safety, and makes contributions to the JHSC.

- Worker and management members of JHSCs have a high level of understanding and concern for health and safety, and make contributions to the JHSC.
- JHSC relationships are positive.
- There is perception of lower levels of danger in the workplace.
- The Ministry inspector is proactive.
- There is a positive labour relations climate.
- The JHSC is perceived by its members to be a decision-making body.
- Inspections by worker members are more frequent.
- JHSC process is more institutionalized.
- The information available to the JHSC is satisfactory.
- The firm is economically strong.
- Worker members meet before JHSC meetings.

Discussion

Most of these factors are highly consistent with previous studies, particularly the findings regarding the importance of general attitudes and orientations, and findings regarding positive committee relations and labour relations climate, as well as the role of external authority (Ministry inspector proactive, Kochan, 1977). Similarly, the finding that satisfaction with information is a facilitator of JHSC functioning is consistent with practice wisdom in this field.

But several findings appear to mark a departure from previous research or new findings. Key among these are:

1. Danger level: evidence that a higher danger level in the workplace acts to reduce perceived effectiveness of committees (or to limit their capacity). This may indicate that the technical and time requirements of JHSCs are much greater in more dangerous workplaces, and that within such workplaces, special resources are required for effective functioning.
2. JHSC as a decision-making body: earlier we noted that many JHSCs are regarded by their members as having gone beyond the Act, particularly in moving from an advisory role to

a perceived decision-making role. These data suggest that such committees are significantly more successful, a finding that could have major implications.

3. The facilitative role of the Ministry inspector: interestingly, **the facilitative actions of the inspector (reviewing, advising) seems to enhance success of JHSCs far more than does purely regulatory action (e.g. issuing orders).** This points towards the value of alternative enforcement roles.

4. Role of frequent JHSC inspections: the results provide support for Ham's hypothesis, that a strong link between worker inspection and the JHSC will be an important contributor to success.

5. Caucusing of worker members: two key variables examined above, problem-solving and negotiating behaviour, seem to have no strong impact on committee success. Yet, caucusing of workers in advance of JHSC meetings is seen to be a facilitator of success. While cooperative process appears to be a central feature of effective committee processes, this finding seems to suggest that the JHSC process is also served by such strategies as caucusing to discuss specific worker concerns.*

These important results are also repeated with some variations in most of the remaining analyses of perceived success/impact.

12.1.2 Perceived Success in Identifying Workplace Hazards Through Inspection

Inspections by the JHSC worker members have been identified as a key element in functioning of JHSCs, as we noted in Chapter 11. We examined factors related to respondents' perception of how well their JHSC identified hazards through inspections.

The Indicator

Our indicator of success of inspections was again, a subjective or perceptual indicator. In this case, worker and management members rated "success in identifying workplace hazards" on a 7-point rating scale, from "(1) Poor" to (7) Excellent".

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*This may also be an indicator of motivated, interested worker members who go to meetings well prepared, or alternatively, an indicator of the positive impact of preparation time.

The Results

The regression results indicated that perceived success of JHSC inspections is greater when:

- JHSC members are perceived to be concerned with and knowledgeable about health and safety.
- Workers and management are generally perceived to be concerned with and knowledgable about health and safety.
- Committee members are satisfied with information received by the JHSC.
- JHSC procedures are more institutionalized.
- Relationships among members are positive.
- Worker members meet before JHSC meetings.

Discussion

These results were much like those found for our initial analysis of five aspects of perceived committee success. As is seen in the following sections, this general pattern is repeated.

12.1.3 Perceived 5 Year Reduction in Danger/Hazards, Improvement in Understanding

The third indicator of success/impact considered was JHSC members' perception of the reduction in danger/hazards, and 5-year improvements in orientation to health and safety of management and workers in general.

The Indicator

This indicator is a composite variable formed by averaging ratings of improvement in three areas: accident danger, health hazard danger, and management-worker understanding of and concern for health and safety. (See *Appendix B.3* for details.)

The Results

The regression results indicate that perceived danger is reduced the most, and understanding improved the most, when:

- Management is positively oriented to health and safety.
- Workers are positively oriented to health and safety.
- There is a favourable labour relations climate.
- There is less perceived danger.
- The committee process is institutionalized.
- JHSC relationships are positive.
- Inspection by worker members are more frequent.
- The JHSC is seen to be a decision-making body.
- The Ministry carries out inspections more frequently.
- There are good linkages between the Ministry and the JHSC.
- The Ministry inspector is proactive.
- The workplace is more complex (more than one building/department/location).
- The firm or organization is economically (or operationally) strong (e.g. at full capacity/hiring, not laying off workers, etc.).
- JHSC management members have authority to agree to recommendations on own.
- Worker members meet prior to JHSC meetings.

Discussion

Findings of the initial regressions are generally reaffirmed here, but several new relationships are identified. Most importantly: the results indicate a wider range of effects for the Ministry, especially that more frequent Ministry inspections are a facilitator of perceived success/impact of the JHSC.

12.1.4 Overall Evaluation of the Extent to Which JHSC Works to Protect Workers

To conclude this analysis, we examined committee members' overall evaluation of how effective the JHSC is in protecting workers.

The Indicator

This indicator was a single question, in which management and worker members were asked: "Is your JHSC working ... extremely well, ... well, ... adequately, ... not working effectively, ... not functioning at all, ... in improving the protection and safety of workers?"

The Results

The regression results indicate that JHSC members' overall evaluation of the JHSC as protecting workers is higher when:

- Worker health and safety orientation is high.
- Worker and management members are more oriented to health and safety.
- The workplace is perceived to be less dangerous.
- Labour relations climate is positive.
- JHSC procedures are institutionalized.
- Members are satisfied with information on health and safety.
- Senior management is represented on the JHSC.
- JHSC relationships are positive.
- JHSC inspections are more frequent.
- The JHSC is perceived to be a decision-making body.
- Worker members meet before JHSC meetings.

Discussion

In this analysis, the role of the Ministry was less clear that in the previous regressions. The analysis of worker members indicated significant impacts for Ministry inspector being proactive, and issuing orders, but these were not evidenced in the analysis of management member data.

12.2 OVERALL EVALUATION OF FACTORS INFLUENCING PERCEIVED JHSC SUCCESS/IMPACT

12.2.1 What Helps JHSCs to Have Impact and Be Successful

We evaluated the overall regression results by identifying those variables that tended to be consistent predictors of perceived impact/success of JHSCs. These are classified into two groups: major determinants as indicated in Display 12.1 (next page) and secondary determinants as indicated in Display 12.2.*

Most important of these facilitators of success were: institutionalization of committee functioning, positive committee relationships and workers meet together prior to JHSC meeting. Other relatively important facilitators of committee success included: worker and management health and safety orientations, economic strength, good labour relations climate, frequent workplace inspections by the JHSC, satisfaction with information, proactive Ministry inspector, and "JHSC is seen as a decision-making body."

One predictor -- workplace danger -- had a widespread effect in retarding JHSC success or impact: generally, the more dangerous the workplace, the more likely that JHSC members would see their committee as less effective.

12.2.2 Discussion

Our findings regarding the importance of attitudes of the workforce in general, training, and information reaffirm our earlier results identifying these as areas of need for JHSCs. As well, the importance of the Ministry role, especially the proactive role of the inspector was reflected in apparent facilitation of JHSC functioning and perceived success.

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*This classification was based on the total number of regression coefficients statistically significant at P = .05 or better, as compared to the number of regressions each variable had been tested in. Predictors were classified as major predictors if more than half of possible coefficients were statistically significant at P = .05 or better.

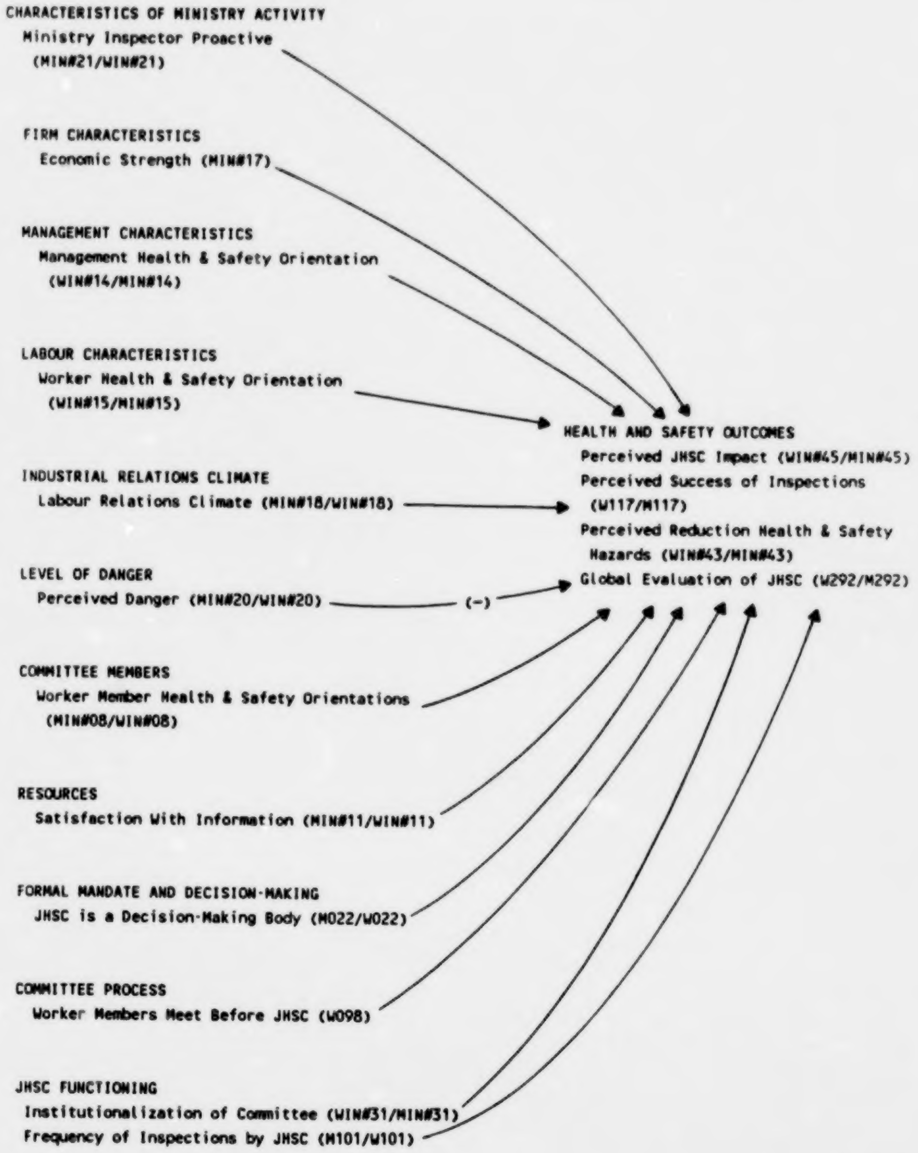
And certain non-findings are significant in themselves: for example, no clear evidence was found for a negative effect for overlap between JHSCs and labour relations structures. This "non" finding goes strongly against the views of Ham and Burkett on labour relations and JHSCs, and will be reviewed in greater depth in Chapter 14.

Our findings regarding the perception of diminished capacity of JHSCs in workplaces perceived to be very dangerous provide cause for thought. These findings serve to remind us that in such dangerous workplaces, needs of the JHSC for training, information and support are very extensive. Further, the results may suggest some limits to the capacity of JHSCs to deal with health and safety matters.

Other findings suggest both important needs for JHSCs, and avenues for potentially improving their effectiveness. Some of these findings and their implications were discussed in Chapter 9 and are further reviewed in Chapters 13 to 16.

DISPLAY 12.1

MODEL OF MAIN FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES
(Arrows show direction of effects for major determinants;
("(-)" signifies a negative effect)


CHARACTERISTICS OF MINISTRY ACTIVITY
Ministry Inspector Proactive
(MIN#21/WIN#21)
FIRM CHARACTERISTICS
Economic Strength (MIN#17)
MANAGEMENT CHARACTERISTICS
Management Health & Safety Orientation
(WIN#14/MIN#14)
LABOUR CHARACTERISTICS
Worker Health & Safety Orientation
(WIN#15/MIN#15)
INDUSTRIAL RELATIONS CLIMATE
Labour Relations Climate (MIN#18/WIN#18)
LEVEL OF DANGER
Perceived Danger (MIN#20/WIN#20)
(-)
HEALTH AND SAFETY OUTCOMES
Perceived JHSC Impact (WIN#45/MIN#45)
Perceived Success of Inspections
(W117/M117)
Perceived Reduction Health & Safety
Hazards (WIN#43/MIN#43)
Global Evaluation of JHSC (W292/M292)
COMMITTEE MEMBERS
Worker Member Health & Safety Orientations
(MIN#08/WIN#08)
RESOURCES
Satisfaction With Information (MIN#11/WIN#11)
FORMAL MANDATE AND DECISION-MAKING
JHSC is a Decision-Making Body (M022/W022)
COMMITTEE PROCESS
Worker Members Meet Before JHSC (W098)
JHSC FUNCTIONING
Institutionalization of Committee (WIN#31/MIN#31)
Frequency of Inspections by JHSC (M101/W101)

DISPLAY 12.2

OTHER FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES

("(-)" signifies a negative effect)

CHARACTERISTICS OF MINISTRY ACTIVITY
- Frequency of Inspection (M264/W264)
- Ministry JHSC Linkages (MIN#21A/WIN#21A)
- Ministry Issued Orders in Past 12 Months (M267/W267)

FIRM CHARACTERISTICS
- Workplace Complexity/Size (MIN#01)
- Health & Safety Program (MIN#16/W222)
- International Operation (-)
- Canada-Wide Operation (-)
- Size of Firm

MANAGEMENT CHARACTERISTICS
- Management Health & Safety/Labour Relations Overlap (MIN#26)

LABOUR CHARACTERISTICS
- Unionized or Not (M246/W246)
- Union Health & Safety Orientation (WIN#23)
- Health & Safety Union Labour Relations Overlap (WIN#27) (-)

LEVEL OF DANGER
- Presence of Designated Substances (MIN#12/WIN#12) (-)
- Presence of Other Hazards (MIN#13/WIN#13) (-)

COMMITTEE STRUCTURE
- Centralized Committee Authority (MIN#33/WIN#33) (-)

COMMITTEE MEMBERS
- Management Member Health & Safety Orientations (WIN#09)
- Senior Management on JHSC (M026)
- Safety Directors on JHSC (M028)
- % Attendance Worker Members (W088A)
- Management Members Can Agree to Recommendations on Own (M165)
- Worker Members Can Agree to Recommendations on Own (W166)

FORMAL MANDATE AND DECISION-MAKING
- Perceived Worker Influence (MIN#34/WIN#34)

COMMITTEE PROCESS
- Negotiating Behaviour (WIN#40/MIN#40)

JHSC FUNCTIONING
- Scope of Committee Activity (WIN#03/MIN#03)
- Legal Response to Investigations (WIN#29/MIN#29)
- Action on Designated Substances (MIN#35/WIN#35)
- Action on Other Hazards (WIN#36/MIN#36)
- Positive Committee Relationships (WIN#37/MIN#37)
- Meeting Attendance (MIN#38/WIN#38)

13. SOME SUPPLEMENTARY REGRESSION ANALYSES

13.1 JHSC SUCCESS WHEN LABOUR RELATIONS ARE POOR

Our analysis in Chapter 12 suggested that committees work less effectively when labour relations are poor. (Poor labour relations were found to be especially negative in impact on committee relationships, but they also negatively affected institutionalization, and most indicators of perceived JHSC success.)

13.1.1 Approach

We decided to examine factors that might be particularly important to success of JHSCs where labour relations are poor. This was done by running separate regressions for JHSCs in workplaces with "below average" labour relations according to our survey. These regressions were run for: (1) perceived 5-year reduction in danger/hazards, improvement in understanding; and (2) overall evaluation of the extent to which JHSC works to protect workers (see *Section 12.1.3* and *Section 12.1.4* for discussion of these indicators, and Appendix B, Displays B.6 and B.7, for detailed regression results.)

Our key question was: are any different factors identified as apparent success factors for workplaces of this type?

13.1.2 Results

Generally, the results (comparing regressions between the several sets of equations) showed a high degree of similarity to the overall results. But these differences emerged:

1. Centralized committee power (main prerogatives in the hand of a single chairman) has a greater effect in retarding JHSC success, in workplaces where labour relations are poor.
2. Stability of management members' term on JHSC emerges as a moderate facilitator of success.
3. Positive committee relations are more important to success where labour relations are poor.

4. Perceptions of greater decision-making power for the JHSC appear to have a stronger effect in facilitating success where labour relations are poor.
5. Management and worker health and safety orientations appear to be more important where labour relations are poor.

These data suggest that greater democracy in the committee (less power in the chair), and more independence for the JHSC (perceived decision-making power) will help insulate JHSCs from the effects of poor labour relations. As well, these data seem to suggest that individual characteristics of the committee members themselves become more important in workplaces where labour relations are poor.

13.2 WHAT AFFECTS PERCEIVED JHSC SUCCESS WHEN DANGER IS HIGH

Our analysis in Chapter 12 indicated that committees in dangerous workplaces are regarded as less successful by their members.

Our assessment was that this indicated application of more stringent evaluations, or alternatively, greater JHSC needs for technical support, and information resources.

13.2.1 Approach

To cast further light on this process, we examined success factors for workplaces which were perceived by JHSC members as more dangerous. This analysis took roughly the same form as that for workplaces with poor labour relations. As well, the regressions predicted the same two outcome variables: (1) perceived 5-year reduction in danger/hazards, improvement in understanding; and (2) overall evaluation of the extent to which the JHSC works to protect workers (see *Section 12.1.3* and *Section 12.1.4* for discussion of these indicators, and *Appendix B*, Displays B.8 and B.9 for detailed regression results).

13.2.2 Results

Comparison of the regression results for "more dangerous" workplaces to those for all workplaces suggested that for more dangerous workplaces:

1. Satisfaction with information is much more important to success for more dangerous workplaces.

2. Ministry linkages to the JHSC, decision-making role of the committees, and more frequent JHSC inspections appear to be slightly more important to success of JHSCs in dangerous workplaces.

13.2.3 Discussion

These results are very preliminary, but suggest particular gains in JHSC efficiency in dangerous workplaces from strengthening the inspection process in committees; strengthening the Ministry presence; and generally, from increasing access to information.

In the Chapter 17 of this report we will return to the question of JHSCs in more dangerous workplaces, and in workplaces where labour-relations are poor. We will outline some specific research strategies to better understand successful JHSCs in these types of workplaces.

13.3 WHY JHSCS ARE NOT OPERATING IN SOME WORKPLACES

One objective of the study was to assess the factors influencing the initial establishment of JHSCs, and to determine why committees are not operating in some workplaces.

We conducted certain regression analyses to determine if a regression model could predict reasons for non-compliance with this basic feature of the Act. We also provide our interpretations of field contacts in workplaces without JHSCs.

13.3.1 Regressions to Predict JHSC Establishment

Regression analyses were conducted using data from the Ministry of Labour information system. The analysis closely reflects descriptive results presented in Chapter 3. This regression analysis indicated that the following factors are statistically significant predictors of committee establishment:

- Larger workplaces are more likely to have committees.
- Unionized workplaces are more likely to have committees.
- Establishments that had been in operation longer are more likely to have committees.

As well, the analysis showed:

- Less than average probability of having a committee in these sectors: finance and insurance (note: these would be "non-office" units within such industries, for example, a maintenance plant in a large insurance complex); and wholesale trade.
- More than average probability of having a committee in these sectors: chemicals and petroleum; machinery and transportation equipment; electrical industry; primary metal and fabricating.

Overall, however, these variations were slight, since most groups and sectors had JHSCs in place at the time of the survey.

13.3.2 Some Qualitative Interpretations

The experience of the researchers in conducting the survey allowed for extensive contacts with managers of firms and other organizations that did not have committees.

Drawing from information obtained during these telephone conversations, the researchers observe that lack of knowledge of the Act and its requirements is probably the main factor accounting for non-compliance. A related factor, of course, is that the Ministry has not, through its inspections or collateral actions by the safety associations, effectively communicated requirements of the Act to the small portion of workplaces without committees.

As well, there is probably a much smaller portion of non-complying firms, where poor labour relations, general lack of interest in health and safety, or administrative oversight have combined to prevent establishment of committees.

Some remedies for this problem are suggested in the concluding chapters of this report, with emphasis placed on both education and enforcement.

14. SUMMARY REGARDING FACTORS WHICH FACILITATE JHSCS

14.1 OVERVIEW

In this section we review the findings in Chapters 11 to 13. The factors examined in the regressions are divided into several general categories. Then, within each category, we consider those that seem to matter in functioning and (perceived) impact, and (in a few cases) those which don't seem to matter. (Some of the findings of "no significant impact", are as interesting or more interesting than some of the findings of "significant impact".)

The criterion for treatment as an important facilitator is a significant regression coefficient for the variable or indicator tested, for at least two different regression equations. Emphasis is also placed on those factors significant in both management and worker questionnaires (except for variables appearing on only one of the questionnaires and thus in only one regression).

14.2 FACILITATING FACTORS

14.2.1 Firm/Organization Characteristics

Surprisingly, firm/organization characteristics are not very important predictors of either functioning or perceived impact. The principal firm or organizational characteristic important for JHSC functioning was the presence of a company health and safety policy or program, including a written component for workers. Economic strength (profitability, or related performance characteristics, such as expanding activity, for non-profit organizations) was also seen to have an influence on perceived impact.

Employee turnover, language difficulties, and experience were seen to have little effect on either functioning or perceived impact. Size of workplace was not clearly significant in its effects when other factors were controlled for. Lack of a significant impact of size was surprising in light of previous research (Beaumont, 1982, page 7), indicating that larger establishments were likely to better institutionalize JHSCs.

14.2.2 Management Characteristics

Positive management health and safety orientation appears to facilitate impact of JHSCs, but does not generally have an effect on JHSC functioning (except for a positive impact on JHSC relationships).

Management health and safety orientation appears to be a critical facilitator of success, which is consistent with previous research and practice wisdom in this field.

An unexpected finding was that actual involvement of senior management members in JHSCs seems to have no clear effect on JHSC functioning or success. In fact, some contradictory effects were noted. The important thing seemed not to be how management staffed the JHSC, but rather the overall commitment behind management's participation. Surprisingly, as well, management's problem-solving and negotiating behaviour were not revealed as major factors affecting perceived success of JHSCs.

14.2.3 Labour Characteristics

Workforce attitudes and understanding of health and safety (knowledge and understanding of Act and hazards) were seen to have a positive effect on perceived JHSC success, but not on functioning. Like commitment from management, worker health and safety orientation also appears to be a facilitator of success. This finding may call for an important shift in "practice wisdom" and programs regarding JHSCs.

Perhaps with good reason, early work with JHSCs (in the 1970's and early 1980's) had to focus on management, to obtain compliance with basic requirements etc. and in particular, management agreement to establish committees. But perhaps as JHSCs have become more established -- with basic institutionalization in place -- real progress becomes contingent upon the very broadly based responsibility system that includes an increasingly informed and concerned workforce.

Unionization had minor, generally positive effects on both JHSC functioning and perceived JHSC success, the area of committee relationships excepted.* Presence of a union appears to facilitate institutionalization, but has a negative effect on committee relationships. Apparently, presence of a union results in greater success of JHSCs, but at the cost of somewhat reduced cooperative process.

This suggests further that some JHSCs which are unionized are working within a conflict-negotiation model, but one which works perhaps as well as other models, with no intrinsically detrimental effects. As noted below, the analysis of overlap between the JHSC and collective bargaining roles suggests similar results.

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*Some previous research (Beaumont, 1982, page 10) suggested that the presence of more than one union retarded success of JHSCs, but no evidence of this was found in our analyses.

To the researchers, these findings are also seen as reminding us that the JHSC process may not always be a process of cooperation alone. Inevitably, some health and safety issues may reflect differing interests of workers and management. In such cases, conflict may be unavoidable, the important question being: how can conflict be best resolved without destroying the JHSC process or weakening internal responsibility generally?

As was found for management, worker member problem-solving and negotiating behaviour does not appear to have major effects on JHSC success. These results were seen as consistent with the view that a variety of problem-solving models may work for JHSCs.

14.2.4 Committee Members' Training and Other Characteristics

More positive health and safety orientations among committee members were seen to have a very positive effect on JHSC functioning and impact (also noted by Beaumont, 1982, page 14). Scope of training was also seen to have a positive effect on functioning. Other factors were found to have scattered and minimal effects.

Surprisingly, presence of senior management on the JHSC was, as we noted above, found to have only modest impact as compared to overall management attitude towards health and safety. Previous research (e.g. Beaumont, 1982, page 13) indicates that this is an important predictor of success.

14.2.5 Committee Structure

Committee structure was not a major factor influencing JHSC functioning or success, but some specific effects were noted: concentration of authority in a single chairman has slight negative effects, especially in workplaces where labour relations are poor; having two or more workers (rather than one) contributes to institutionalization of JHSC processes.

Committee age was not a clear predictor of JHSC functioning or success. Some previous research had suggested an important impact of age, as committees become more established,* but this was not clear here. In fact, committee age has some positive impacts on institutionalization and inspections, but negative effects on committee relations. Committee age has no apparent effect on JHSC success/impact. An implication is that we cannot expect JHSCs to grow out of their current problems simply through passage of time.

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*G. Bryce and P. Morgan, "*Are Joint Labour-Management Occupational Health & Safety Committees Effective?*", unpublished paper, 1984, page 19.

14.2.6 Committee Information

Satisfaction with information about health and safety has an important positive effect on functioning and perceived success/impact of JHSCs. This was strongly reflected in both worker and management member analyses, and appeared to be a particularly important factor in workplaces that were regarded as more dangerous.

Thus, recent proposed changes in legislation to provide greater information in the workplace will no doubt be of value to JHSCs.

14.2.7 Committee Functioning and Institutionalization

Institutionalization of JHSC functions (regular meetings, formal procedures, taking minutes, etc.) was found to have a positive effect on perceived success of the JHSC. This suggests the wisdom of many features of the current Act which reinforces institutionalization, and reaffirms the importance of improving compliance with those features of the Act.

Positive relationships in JHSC functioning were found to have a particularly strong effect in facilitating perceived success/impact.

As well, frequency of inspection by JHSC members appears to greatly facilitate JHSC impact, a finding which could be of great importance to any review of the Act, given its somewhat ambiguous treatment of inspection.

14.2.8 Formal Mandate and Decision-Making

Having written terms of reference for the JHSC was found to be a facilitator of institutionalization of committee functions.

Identification of the JHSC as a decision-making body also appears to have a positive effect on perceived success/impact. Many workplaces appear to have gone beyond the Act by treating the committee as a decision-making body rather than purely advisory, and in so doing, have conducted a useful experiment. Other workplaces may wish to follow this lead. In the same vein, a shift of legislation to facilitate a wider mandate could greatly improve effectiveness of JHSCs. (An alternative causal interpretation, which requires consideration, is that more effective JHSCs are regarded as decision-making bodies merely because of the impact of their recommendations etc.).

14.2.9 Committee Process

Surprisingly, problem-solving and negotiating behaviour between worker and management committee members were not clear factors in perceived JHSC success. This was seen by the study team as further evidence for our conclusion that perhaps very different types of committee "models" or processes work for different types of workplaces.

Only one indicator somewhat reflective of a negotiating stance -- worker members caucusing before JHSC meetings -- was found to be an important facilitator of JHSC success/impact. Such caucusing was found to be a significant facilitator for every indicator of committee success examined. While such caucusing could certainly be used for planning and positive problem-solving, it may also allow for a more "freewheeling" assessment of unique worker concerns with health and safety issues, or may reflect positive effects of preparation time for worker JHSC members.

These findings reflect, in our view, the importance of structure in the internal responsibility system, and its capacity to mobilize information and other resources for problem-solving. Although cooperative problem-solving is central to the JHSC process, the effective linking of the different parties in the workplace may require institutions which sometimes mobilize contradictory interests.

Interestingly, distribution of influence in the committee in favour of workers is seen as a moderate facilitator of JHSC success in analyses of both manager and worker member perceptions. This reflects perhaps, the central importance of worker input to the JHSC process that we have noticed above. Perhaps where worker JHSC member input is seen as more meaningful or more likely to have a real effect, more concern and better results generally are achieved by the JHSC.

14.2.10 Industrial Relaitons Climate

Good labour relations climate has a generally positive effect on positive committee relationships and perceived success of the JHSC. Positive labour relations climate is one of several key facilitators of both functioning and perceived success of JHSCs. Our data suggest that this is mainly through the impact of good labour relations on positive committee relations. (As well, our results in descriptive analyses indicated that members of a substantial number of JHSCs report that work on their committees has in turn had an impact in improving labour relations.*)

Where labour relations are very poor, our analyses suggest that the work of the committee benefits more from internal strengths than is true for JHSCs generally (e.g. independent mandate, better relations among members). These data may

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*See *Section 11.1.3.*

suggest that the Ham(1976)-Burkett (1981) hypothesis about keeping the JHSC separate from such tensions, may be appropriate for some workplaces where labour relations are very poor and where conflicts go unresolved, but as we note below, their hypothesis is rejected as a general rule.

14.2.11 Overlaps Between the JHSC and Persons Involved in Collective Bargaining

Ham (1976) and Burkett (1981), both placed great emphasis on the separation of the JHSC function from collective bargaining. They argued that overlap between collective bargaining processes and structure would introduce an inappropriate and destructive atmosphere into the ideally cooperative JHSC process.

This issue was examined in separate regressions for unionized workplaces only. (Overlap between JHSC and collective bargaining was measured directly by asking management and worker members about the number of management and worker members who were also involved in collective bargaining or (on the labour side) who were union officers.)

The results suggest that only mild effects result from overlap between the JHSC and collective bargaining roles. A single positive coefficient of labour relations/JHSC overlap was noted for one of four success/impact indicators examined for management members; a single negative coefficient was noted for one of four regressions conducted for worker members. (See *Chapter 12* and *Appendix B* for details.) No clear result was indicated.

These data seem not to support the position of Ham and Burkett. Instead, these results suggest that the advantages of using the structures of collective bargaining and the skill repertoire of those in the collective bargaining milieue may in most cases off-set any disadvantage of the conflict-negotiation model. This indicates that in a workplace where skilled leadership exists within collective bargaining structures, and where a repertoire of effective problem-solving skills has developed within a negotiating approach, these are probably skills that a JHSC needs in such a workplace.

Of course, a different approach will be desirable where such skills are uneven or poor, and different types of skills may be essential on JHSCs where labour relations are very poor (see *Section 14.2.10*).

14.2.12 Level of Danger

More dangerous workplaces seem to have a higher level of JHSC functioning, but lower levels of perceived success/impact. The researchers see this finding as suggesting one or both of the following: (1) JHSC members in dangerous workplaces are using a more critical standard to evaluate their work; and (2) more difficult problems arise in such workplaces that may exceed the JHSCs' technical capacity or other resources (e.g. time).

These results are regarded as suggesting greater needs for training and information in these JHSCs, and possibly limits to the capacity of the JHSC itself. Ham anticipated this type of problem perhaps, when he noted: "... if the internal system of direct responsibility functions below some reasonable level of effectiveness, it may mean that the capacity of the organization is too limited to make use of the information provided by the committee ..."*

The regression findings regarding level of danger lead us to view the needs of more dangerous workplaces as being, perhaps, very special. This, we suggest in Chapter 17, could be a specific topic for follow-up studies.

14.2.13 Ministry Activity

The presence of a proactive inspector was found to have a very positive effect on JHSC members' assessments of success/impact, and on some aspects of functioning (institutionalization). Numerous other effects were illustrated, for example other linkages to Ministry (e.g. touring with inspectors) are important facilitators of success, but stronger enforcement action (e.g. issuing orders per se), has few effects. In virtually every area examined, the Ministry role appeared to be important to facilitation of JHSC functioning and success.

Significantly, the regressions suggest that the most important role for the Ministry seems to be that of facilitator (advising JHSCs etc.), rather than enforcement per se (issuing orders). This might also reflect some tendency on the part of most inspectors to rely on persuasion, and to regard issuing of serious orders as a "last resort".

In whatever role, these results point strongly to the need for a stronger Ministry presence, and a higher level of inspection activity generally (since the inspector's facilitation role can only be pursued in the course of inspections). These needs are addressed in the concluding chapters of the report.

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*From: *Report of the Royal Commission on the Health and Safety of Workers in Mines*, James M. Ham, 1976, page 157.

PART IV:
CONCLUSIONS AND RECOMMENDATIONS

15. CONCLUSIONS

A number of major conclusions emerge from the study. The significance of these conclusions derives mainly from the fact that they represent and reflect the assessments and "front line" wisdom of a major portion of those persons who deal with health and safety on a day-to-day basis in Ontario's workplaces. The validity of their views is strengthened by the similarity of results drawn from analyses of worker and management member data, and from the consistent emergence of several themes throughout the analysis. Please note that conclusions have section references to the part of the report from which conclusions are derived.

15.1 GENERAL SUCCESS

Three factors point to general success of the initiative to establish JHSCs through the 1978 Occupational Health and Safety Act. First, the percentage of workplaces with JHSCs has grown dramatically, since 1978. Whereas only 37.4% of these workplaces had JHSCs in 1978, in 1985, JHSCs were found to exist in 92.9% of workplaces (Section 3.2.1). Second, most JHSCs now in existence are found to undertake such basic functions as having meetings and taking minutes (Chapter 4), and conducting inspections and so on (Chapters 3 to 10, generally). Third, a majority of worker and management members of JHSCs evaluate their committees as having positive impacts on health and safety (Chapter 7).

15.2 THE PROBLEM OF NON-COMPLIANCE

Against the general success of the Act in helping to establish JHSCs, major problems of non-compliance are noted:

1. In addition to lack of committees in some 7% of workplaces with 20 or more workers, our study found JHSCs do not exist in about 33% of workplaces with less than 20 workers and designated substances present.

2. Widespread non-compliance was illustrated for a wide range of specific feature of the Act. Of workplaces with JHSCs, only about 22% are reported to be in full compliance with the Act: some 78% of workplaces are reported to be non-compliant in some manner (Chapter 8).

> Some areas of non-compliance are matters of particularly serious concern. These include such apparent problems as extensive management selection of worker members, non-compliance regarding investigations, and non-compliance with requirements for designated substances. Other forms of non-compliance, as regards failure to meet quarterly, failure to take minutes regularly, etc., no doubt have a cumulative effect in retarding the ultimate effectiveness of JHSCs.

15.3 THE PROBLEM OF MARGINAL AND FAILING COMMITTEES

Not surprisingly, considering the apparently widespread non-compliance with key features of the Act, many committees are failing or marginal in their performance. By their own appraisal JHSC members classify about 30% of JHSCs as just adequately functioning, and about 12% as functioning poorly or not at all (Sections 7.1, 7.3, and 10.4).

These committees should be a major concern for all groups concerned with health and safety in Ontario workplaces.

15.4 NEED FOR TRAINING AND INFORMATION

The study results clearly point to a significant shortfall in training of JHSC members to deal with health and safety issues. Many JHSC members report that their members had no training in health and safety matters, and this was particularly pronounced for worker members of JHSCs. Of management members, 19% reported no health and safety training whatsoever, but 39% of workers reported no training (Section 4.1).

Similarly, many JHSC members, especially workers, report low satisfaction with the kind and type of information made available. The fact that satisfactory information is an important predictor of perceived JHSC success gives these findings added importance (Section 4.6).

15.5 THE NEED FOR BETTER WORKER UNDERSTANDING AND WORKER CONCERN FOR HEALTH AND SAFETY

A major finding throughout the study was the great significance of poor worker concern with, and knowledge of, health and safety. Their low level of concern and low input to JHSCs were identified as major concerns by manager and worker members alike (Chapter 3).

In many workplaces, such lack of concern with health and safety appeared to limit success of JHSCs. Where worker concerns with health and safety are low, JHSCs function poorly. JHSCs that function poorly cannot educate and mobilize workers to the task of improving health and safety, and so on, in a circle. Only education and training can break this circle, and create the necessary attitudinal framework for the internal responsibility system to work effectively.

15.6 UNCONNECTED COMMITTEES: THE ISSUE OF STRUCTURE

A part of the marginality or failure of committees, is the lack of connection to a broader, working internal responsibility system in the workplace. At the core of this problem are workplaces where:

- JHSC members do not report to those they represent.
- Management does not reply at all to recommendations of JHSCs.

Non-reporting is a particular problem on the worker side, where, especially in non-union work-places, a substantial portion of worker JHSC members never report at all to those they are supposed to represent. In these workplaces, the JHSC would appear to be isolated and in merely nominal compliance with the Act. Indeed, such nominal existence of a JHSC seems to be false evidence of the working of internal responsibility. Where there are no structures to mobilize workers, and especially where worker interest is low, the creation of viable JHSCs faces severe obstacles.

15.7 PROBLEMS WITH INVESTIGATION OF CRITICAL INJURIES AND WORK REFUSALS

Considerable problems were reported with compliance with the features of the Act relating to investigations of work refusals and critical injuries (Section 4.3).

Management members report full compliance with various features 75% to 95% of the time. Workers however report full compliance only about 50% of the time. These results suggest substantial concern on two counts.

- Firstly, even if management members' higher estimates of compliance are accurate, the amount of non-compliance would be considerable.
- Secondly, the gap between worker and manager views suggests that considerable confusion exists (among workers and managers) as to the meaning of these provisions of the Act. Such confusion, if confusion is the explanation, should be remedied.

15.8 PROBLEMS WITH DESIGNATED SUBSTANCES

Similar problems were noted with designated substances, and provisions for assessments, control programs and reports. In this area, as with investigations, worker and manager reports were far apart (*see Section 4.4*).

As a rule, management members of JHSCs report much higher levels of compliance than do workers, but overall, both report fairly low levels of compliance. For example:

- 71% to 83% of management members report assessments completed for all designated substances present the time of the survey (estimates vary with alternative criteria for determining presence of designated substances).
- 58.4% to 74% of workers report assessments completed for all designated substances present (estimates vary with alternative criteria for determining presence of designated substances).

Equally interesting were reports regarding awareness of presence of designated substances: (1) JHSCs were not always certain what designated substances were present; (2) designated substances were frequently reported by JHSCs to be present in the workplace, where the Ministry of Labour appeared to be unaware of this (these were instances of the JHSC reporting presence of designated substances not evidenced in the Ministry's information system).

15.9 OVERLAP OF JHSCs WITH LABOUR RELATIONS STRUCTURES

A surprising finding emerged as regards the overlap of JHSCs with labour relations structures. Previously, Ham (1976) and Burkett (1981) had argued that JHSCs should be kept separate from union positions etc., or other participation by persons involved in collective bargaining. Their view was that this would avoid introduction of a conflict model to the more cooperative environment of the JHSC.

The regression analyses for this study suggested no clear effects of overlap between the JHSC and labour relations structures. Participation of union officers or management persons involved in collective bargaining in the JHSC neither clearly helped nor hindered the work of JHSCs.

These results, overall, are seen as refuting the Ham-Burkett hypothesis on labour relations and JHSCs -- and as pointing towards the viability of a number of models of JHSC functioning. Such alternative approaches could, it appears, include cooperative models and negotiation models.

15.10 NEED FOR EDUCATION AND BETTER COMMUNICATION OF PROVISIONS OF ACT

Several results pointed towards a need for more education, as regards provisions of the Act, and regarding the importance of health and safety generally.

This is especially indicated in the apparently widespread need reported for improved orientations to health and safety among members of the workforce in general (especially worker knowledge of the Act).

Similar needs are suggested by management's widespread partial compliance with the Act (much of which is attributable to need for education of management and workers).

15.11 NEED FOR MORE MINISTRY INSPECTION AND BETTER FACILITATION OF JHSCS

Two of the most important findings of the study were the indications that:

1. The Ministry inspector can play a powerful and effective role in facilitating success of the JHSCs; particularly in the facilitative role, the Ministry inspector has a very significant and positive impact.
2. But the Ministry role as facilitator is taken up only partially and to a variable extent: the data suggest that not all inspectors pursue the facilitator role fully, and generally, the level of effort indicated seems to be much less than would be required to achieve best performance of JHSCs.

These findings suggest that the Ministry role has been less than that required to facilitate the implementation of the significant industrial experiment which introduction of mandated JHSCs has comprised. The high rate of non-compliance noted in the study analysis is evidence supportive of this view, that enforcement is weak.

This shortfall in effort may come down simply to the fact that the Ministry Inspection Branches have been understaffed relative to the magnitude of the task given them. In any case, the Ministry Inspection Branches are the most powerful tools available to policy makers, and should be used to consolidate gains to date with JHSCs. A comprehensive evaluation of the Inspection Branch programs would therefore be desirable to determine in exactly what ways (increased staffing, or whatever) the positive impacts of the Ministry could be expanded, and progress of JHSCs consolidated.

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*See Display 4.10 for explanation of these ranges.

15.12 THE OVERALL PATTERN OF FINDINGS

15.12.1 Underlying Themes

The overall findings of the study have an integrity which goes beyond any single statistic or result, reflecting a number of basic themes which emerge across several analyses:

- The importance of the Ministry role is reflected in descriptive findings and in regressions emphasizing the importance of the inspectors' facilitation role. Importance of these findings is underlined by overall patterns of non-compliance.
- The need for strengthening of JHSCs is reflected in: partial institutionalization; partial completion of key functions (e.g. investigations and designated substances); and in JHSC members' views of needs of JHSCs.
- The need to strengthen worker resources for participation is reflected in need for worker training, improved worker support, and underlined by regression findings such as those regarding the impact of workforce attitudes, impact of satisfactory information, and impact of worker caucusing.

15.12.2 Towards a Model of the Internal Responsibility System

Most importantly, the study results point the way towards a model of the internal responsibility system which seems to explain why it is that some JHSCs appear to succeed while others fail.

Significantly, the explanations all have to do with basic sociological realities and processes, which can be arranged in a logical manner, and from which policy implications can be deduced.

For example, the sociological reality is that JHSCs work less effectively where understanding of workers and managers is poor, where training is lacking; where information is poor; and where Ministry support is weak The study results tell us that changes in these basic conditions should bring about greatly improved effectiveness of JHSCs.

The policy reality and implications are that considerable effort and considerable informed application of resources will be required to turn around these conditions and make internal responsibility work more completely, to provide the protection workers are entitled to.

16. RECOMMENDATIONS AND ISSUES

The Technical Advisory Committee directing the study has invited the study team to submit its observations and recommendations.

Accordingly, the following recommendations are submitted, as part of our report. It is hoped that these suggestions will aid the Advisory Council in formulating its recommendations to the Minister of Labour. These are by no means the only recommendations which could flow from the study data. New recommendations may come to the fore as the report is reviewed, and as new questions are asked, and even as new analyses may be undertaken.

In any case, the following are submitted to the Advisory Council as representing the study team's view of steps which might be taken to further the effectiveness of Joint Health and Safety Committees in Ontario. These recommendations are interrelated, and reflect the view, that effective JHSCs can only be developed in a comprehensive responsibility framework including a clear and effective role for government, and an internal responsibility system that works because it recognizes the sociological realities of the workplace.

Recommendations are presented in four areas: (1) implementation of the Act; (2) training, education and information; (3) JHSC structures; and (4) JHSC functioning. Each recommendation is offered in conjunction with the study team's rationale, and a brief discussion.

16.1 IMPLEMENTATION OF THE ACT

Recommendation 1: The Ministry Role and the Inspection Branch

A comprehensive evaluation of the Ministry's Inspection Branch, and its role in supporting JHSCs should be undertaken, to ascertain ways in which the Ministry's implementation of the Act as regards JHSCs could be improved.

Rationale and Discussion: The high degree of non-compliance with the Act evidenced by the surveys is a matter of major concern. The study results suggest that more effective educational and enforcement action by the Ministry would assist in remedying this problem. The path to effective application of the powerful tool which is the Inspection Branch, is a comprehensive evaluation of the Inspection Branch Program.

Such an evaluation could be undertaken by the Advisory Council or another agency, and would assess the extent to which the suggested problems in the inspection program are valid, and the extent to which these arise from: lack of manpower alone (a very probable cause), or the extent to which other strategic factors also affect operation of the program.

The evaluation would address: (1) the appropriateness and possibility of strengthening the facilitative role of the Ministry, and particularly the specific manpower requirements of facilitative strategies outlined in the Ministry Operations Manuals; (2) the frequency of inspections; (3) more effective linkages to the JHSC, in general; (4) the even-handedness of contacts and information flow to worker and management members of JHSCs; (5) treatment of designated substances; (6) the Ministry's method of defining workplaces where this differs from organization of production or of the JHSC; and (7) comprehensiveness of coverage (ie. how the inspection system can achieve more complete coverage of workplaces under the Act). (See Section 2.2.2 for related discussion.)

One factor limiting the Ministry's effect may be the fact that Ministry inspection resources appear to be concentrated on larger, unionized establishments, where JHSCs are better established, rather than on the unorganized sector and smaller establishments where problems appear to be greater.

The study results clearly point to the facilitative and aiding role of the Ministry as a key factor supporting the growth and effectiveness of JHSCs. Accordingly, this valuable capacity should be carefully explored and maximized. A comprehensive evaluation would achieve these effects.

16.2 TRAINING, EDUCATION AND INFORMATION

Recommendation 2: Training

Training programs in health and safety should be greatly expanded for members of JHSCs. This applies in particular to workers, who are greatly disadvantaged as regards training.

Rationale and Discussion: Our study results point to major gaps in training, expecially for workers, nearly 40% of whom have no health and safety training whatsoever. Training was identified as a highest priority need by workers and managers alike.

While an appropriate approach to dealing with this problem could be simply to expand existing programs, the question of evaluation also comes to the fore. Clearly, the programs which have operated over the past several years have not been sufficient to meet the needs. A comprehensive evaluation of the training programs of the safety associations, and of organized labour, possibly conducted under auspices of the Advisory Council, could provide useful insights regarding total demand, methods of delivery to reach those in need, and other issues.

Recommendation 3: Education of Managers and Workers Regarding Provisions of the Act

The Ministry and concerned parties (the safety associations and organized labour) should consider a program to educate management and workers on provisions of the Act related to JHSCs. The Act could also stipulate that popularized descriptions of rights and obligations under the Act be posted prominently in the workplace.

Rationale and Discussion: To a great extent, non-compliance by management is probably simply the result of management's unawareness of responsibilities. Ministry enforcement will assist in this area, but general educational efforts would also be of value. More general campaigns aimed at workers seem to be highly desirable, since reports of JHSC members suggest that worker knowledge of the Act (their rights and role within internal responsibility) is poor.

Some clarification of what is meant by "prominently", including number of locations or number of postings for large workplaces, or in each major work area, would aid in clarifying any requirement for posting of information, and could be applied also to the Act's requirement that names of JHSC members be posted.

Recommendation 4: General Education for the Workforce on the Importance of Health and Safety

The Ministry and concerned parties (organized labour and the safety associations) should develop new education programs to promote better worker concern and understanding of health and safety.

Rationale and Discussion: Our study results suggest that workers are highly variable in their concern for health and safety, that their concern is very low in many workplaces, and that JHSCs work best when support from workers is strong. JHSC members' identification of improved worker support as a major need of JHSCs, points to the desirability of strong action in this area.

Very possibly, the best method of targeting such education would be within the workplace itself, ideally with the JHSC as the educational initiator. JHSCs could provide such education if instructional models and materials were provided. Such a program might also require methods to provide funds or relevant resources to JHSCs, at least in the initial stages. Experimentation with a variety of approaches would probably be desirable, and supplementary educational effort through the mass media would also be supportive.

Recommendation 5: Information on Health and Safety Matters

Obstacles to full information on health and safety should be minimized through legislation and also through programs to facilitate provision of, and easy access to, existing information.

Rationale and Discussion: Information was identified as a high priority need for workers especially, and also for managers. It was also identified as a key factor facilitating success of JHSCs, particularly in dangerous workplaces. Implementation of the new proposed legislation, Bill 101, will be a start in this direction.

16.3 JHSC STRUCTURE

Recommendation 6: Committee Membership

The Act should require that at least two workers be on the JHSC.

Rationale and Discussion: This would facilitate improved contributions to the JHSC by workers, and is consistent with our findings in the regression analyses, that presence of two or more worker members aids institutionalization of JHSCs.

Recommendation 7: Committee Co-Chairpersons

JHSCs should be required to have two co-chairpersons, respectively chosen by management and workers.

Rationale and Discussion: This would have two effects: (1) to reduce the impact of concentrated power in a single chair, which was found in our regression analyses to have a negative impact on JHSC functioning; and (2) to facilitate worker involvement in JHSCs.

Partly as a matter of clarifying philosophical underpinnings of internal responsibility (much in need of reinforcement and elaboration in the Act), this step would underline the joint responsibilities of workers and managers, and also aid in raising the image of "importance" for JHSC members. This could improve the extent to which workers generally would regard the JHSC as serious and something they should contribute to.

Recommendation 8: Selection of Worker Representatives

The requirement for selection of worker JHSC members should be strengthened under the Act. Specifically, where they are not chosen by a union, the Act should require that worker JHSC members be provided work time to organize an annual meeting solely of workers, to select worker JHSC members.

Rationale and Discussion: This would curtail management involvement in selecting worker JHSC members. The importance of this feature of the Act (the selection of worker members) may warrant some method to verify this step, for example, a written declaration to be attached to the JHSC minutes, indicating that such an election was held, the declaration to be signed by a management and a worker member. The Ministry would provide information to workers on their rights in this respect, and perhaps arrange for elections to correspond with a visit of the Ministry Inspector, in cases where supervision would be a matter of concern.

16.4 JHSC FUNCTIONING

Recommendation 9: Inspections by JHSCs

The requirement for JHSC member inspections under the act should be strengthened, to allow for a minimum frequency of inspection, perhaps of once per month, with exceptions to be approved by the Ministry.

Rationale and Discussion: This is quite different from the current system, with its vague requirement and a maximum frequency of once a month. This would significantly increase the frequency of JHSC inspections. Since JHSCs were found to report greater success when committee inspections are more frequent, such a shift in strategy would be expected to improve effectiveness of JHSCs.

Recommendation 10: Investigations

Investigations of work refusals and critical injuries fatalities should be clarified, through a mandatory joint worker-manager report to be attached to JHSC minutes.

Rationale and Discussion: Such a report would be completed using a simple form prepared by the Ministry, and signed by both management and worker members of the JHSC. The study team believes that such a procedure would reduce confusion as to exactly what was done.

Recommendation 11: Time for JHSC Preparations

The Act should specifically allow worker JHSC members preparation time for meetings as an official function of the JHSC.

Rationale and Discussion: The regression analyses conducted for the study indicated a clear positive effect of advance meetings of worker JHSC members, in facilitating perceived success of the JHSC. When workers met ahead of time to plan, JHSCs were judged to be more successful. As well, "more time to study technical information" was identified as something that "would help the JHSC", by 62.7% of worker members. Only more support from management and workers in general, more training, and more information were noted as being of more help than "time".

Recommendation 12: Management-JHSC Consultation

Management should be required to advise the JHSC of all health and safety policy and program developments within the employer's health and safety divisions (if any).

Rationale and Discussion: As was noted in the introduction to this report, an anomolous feature of the 1978 Act was that strictly speaking, it did not require management to consult with JHSCs generally on health and safety matters. The Act of course prescribes information management must provide and other supporting responsibilities. But strictly speaking, the Act could allow an employer to operate a general health and safety program in isolation from the JHSC.

Recommendation 13: Management Responses to Recommendations

Management should be required to reply in writing to all written recommendations made by the JHSC.

Rationale and Discussion: This would help to eliminate non-communication between management and JHSCs.

That this is in fact happening in some workplaces is strongly suggested by worker reports for some JHSCs, that JHSC recommendations are often rejected with no explanation (about 10% of JHSCs reported this). In such situations, the JHSC is clearly not working with management, and such committees are merely a "show" of internal responsibility.

Recommendation 14: Effective Communication of the JHSC with Workers

To allow JHSCs to communicate more effectively with the workforce, these changes are recommended.

(a) minutes or other communications of JHSCs should be distributed to workers, at least quarterly;

(b) the right of workers to meet periodically with their JHSC members, on work time, to discuss work hazards or problems, should be included in the Act.

Rationale and Discussion: Better communication is much needed, to strength the information flow regarding health and safety, and to assure that the JHSC is an integrated portion of the internal responsibility system.

Poor communication with workers was noted to be a particular problem for committees, especially in non-unionized workplaces. Steps such as the above would greatly strengthen the communication process, and probably contribute to improved health and safety orientation in the workforce generally.

16.5 ISSUES FOR FURTHER CONSIDERATION

Several issues arise which go beyond the scope of this study, and which call for wider and ongoing discussion and review. Among these, the functioning of the Ministry Inspection programs is clearly the most significant, and warrants treatment as noted above, in a comprehensive evaluation. But a number of other issues deserve further consideration.

16.5.1 Small Workplaces With Designated Substances

The problem of "no committees" in small workplaces with designated substances appears to be a particularly severe problem, among all of the non-compliance problems noted. This problem may simply disappear with more aggressive enforcement. Indeed, this is the probable solution in the view of the research team.

But the problem may be more basic. It is possible that the "committee" approach is simply not suited to workplaces which are so small (some have only 2-10 employees).

This situation should be carefully monitored, and, if the situation does not remedy itself through stronger enforcement, then consideration should perhaps be given to alternative approaches in the Act itself.

16.5.2 Economic Issues

Our analysis suggests that where economic performance is poor, JHSCs may function less effectively, presumably because when changes require expenditure, these must be paid for from an inadequate financial pool.

In such a situation, management and workers may collaborate to place health and safety behind priority on wages and profits. This might be remedied for certain types of depressed industries, by financial assistance for up-grading health and safety practices, or by other support for JHSCs.

As well, the situation of health and safety in depressed industries could well be a useful topic for further research (see Chapter 17).

16.5.3 Clarifying the Objectives of the Act

It would be useful for the Ministry to prepare a discussion paper outlining more clearly the objectives, and premises of the Act as regards JHSCs and internal responsibility. No such statement accompanied the 1978 Act, a fact which may explain some of the problems that have been noted.

Such a paper could be a useful part of a consultation process, to clarify the meaning of, and to create a better understanding of the JHSC and internal responsibility process.

16.5.4 Workers' Influence, Workers' Responsibility

Another very important concern is the issue of worker ability to influence health and safety matters, and the responsibility which should be attendant to increased worker influence. A number of our findings suggest that Ham's conclusions of 1976 still apply: that workers lack the power to play a full role in the internal responsibility system.

As Ham perceived the situation in 1976, workers lacked a mandate to influence health and safety matters (except where that right had been gained in collective bargaining) and generally lacked information, training etc.

These study results suggest that worker rights and resources have been greatly expanded, but that their ability to make a full contribution is still limited by lack of information, lack of training, lack of resources, and (where the act is not complied with) lack of certain basic rights.

Some of the recommendations we have suggested above would help to improve this situation, by strengthening worker resources (information, training etc.), and generally by strengthening the role of the JHSC. Overall, the evidence in the study suggests that a greater shift of decision-making power to JHSCs will result in more effective committees and improve health and safety. As well, such a step would would probably increase and strengthen worker contributions to JHSCs.

16.5.5 Towards a Meaningful System of Responsibility

Generally, the study results suggest considerable validity for the network of assumptions which lay behind Ham's (Ham, 1976) original conceptualization of the internal responsibility system.

Ham's observations on the role of the broader responsibility system have also been validated to a great extent by our results which (1) emphasize the importance of the role of the Ministry of Labour in facilitating the effective working of internal responsibility in the workplace; and (2) emphasize the importance of the broader internal responsibility system, especially the role of the workforce at large.

These study results point towards a number of steps to further strengthen the operation of JHSCs. But future development of JHSCs must emphasize the fact that the JHSC is not an end in itself, and that it cannot work in isolation.

JHSCs by themselves, without accompaniment by the fundamental workings of internal responsibility -- meaningful responsibilities, protected rights, concern and communications, and effective representation -- will not enhance internal responsibility. Unless fully developed through careful legislation and implementation, through training and education, and unless fully integrated with the workplace, the JHSC leads not to self-regulation, but rather self-deception.

17. RESEARCH: NEXT STEPS

One purpose of the study was to identify issues, and to lay the foundation for further research to expand on the new understanding resulting from this study. In spite of the generally useful information, and many important findings which come from this study, it remains exploratory in several ways:

1. It is a first study of this type, and because it is exploratory, certain findings should be pursued in depth.

2. Specific questions arise from the study which should be amplified by further investigations.

As well, the study was limited in its design to study of perceptions of impact, in that it could not address the issue of actual impact of JHSCs on objective health and safety outcomes. Further research is needed for these reasons, and can be developed effectively on the research foundation created by this study.

17.1 USE OF THE EXISTING SURVEY DATA

A major and economical step to expand our understanding of the study results could include further investigations of the survey data itself.* Not all issues could be examined within the limited budget for the study analysis, and some of these could be further examined by researchers at modest cost.

We believe that certain issues will emerge in the review of the study's implications, some of which could call for further regression analyses, and tabulations. Indeed, this should be a first step for some issues which might otherwise call for further original research (such as surveys). The data obtained in this study should be more fully explored.

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*As well, the results generally merit wider distribution which could be facilitated through publication of results in health and safety journals and academic publications.

17.2 FOLLOW-UP STUDIES

17.2.1 The Original Follow-up Study Concept

At the time the study was initiated, the logic was to conduct the initial study, to use the survey data to identify "successful" committees and "failed" committees, and then to proceed to a more detailed study of those specific committees to identify causes of success and failure.

This approach is a valid and useful one, and can be readily addressed using the study data which has been obtained. But the original concept of follow-up focused mainly on method: the concept of follow-up using potentially more powerful data collection methods such as personal interview surveys. In the study team's view, it will be more important that follow-up studies focus on important issues, than on method per se.

17.2.2 Some Elaboration on the Follow-up Study Concept

Some such studies could include the following:

- An examination of the situation of designated substances in workplaces would be extremely useful. This would help to clarify a number of questions that have emerged here about the treatment of designated substances.
- If the functioning of committees in an environment of poor labour relations is a major concern, then considerable benefit might come from a study to assess in more depth what it is, in particular, that helps a JHSC, where labour relations are poor.
- The relationship between "true" and perceived competence in health and safety requires further examination. A study to follow-up on JHSCs and compare their own performance (in inspections etc.) with the standards of trained health and safety experts could provide a useful extension of these study results, and also insights on the development of self-evaluation tools (see *Section 17.2.5.* below).
- Further research could help to clarify the factors that contribute to management and worker disagreement and disagreement about the success of committees. Here, we have attributed this to lack of communication, or possibly a win-lose concept of the JHSC and its outcomes for each side. Better understanding of both issues will be a contribution to our views of how to make JHSCs work better.

- If the functioning of committees in more dangerous workplaces is more complicated and if there are special needs that JHSCs have in such workplaces, then this should be examined in follow-up studies specifically focused on these types of workplaces.

- A follow-up study could usefully examine the functioning of JHSCs in more depressed industries, where the economics of health and safety may constrain JHSCs and thus limit protection of workers.

17.2.3 Some Alternative Research Concepts

Specific follow-up studies might focus with even greater usefulness on some related issues that have emerged in this study. For example,

- If worker input and cooperation with the JHSC is a critical concern in functioning of the overall internal responsibility system, then considerable advantage might be found in a study to explore the techniques that committees use to increase or maintain worker participation (including the process of selecting worker JHSC members).

- In a related vein, a follow-up study to examine the awareness of and general attitudes of, workers and managers to health and safety and the JHSC process could provide valuable understandings of how JHSCs relate to workers and managers in the broader responsibility system, and what it is that makes workers participate or makes managers commit themselves to health and safety. Such a study would provide useful insights on the design of educational programs, and perhaps even the more effective design of legislation.

- Specific models for up-grading performance of JHSCs could be tested in demonstration projects, to see what kind of training and what kinds of resources really make for improvement.

17.2.4 Towards an Impact Study

Perhaps of greater importance, is the topic of an impact study to look at objective impacts of JHSCs (and other aspects of the responsibility system) on health and safety.

Such a study would be an even more major undertaking than this study, but could be vital to the extension of our knowledge of what JHSCs really accomplish.

17.2.5 Research on an Ongoing Evaluation System

Study results suggest that there is strong need for an on-going evaluation system for JHSCs, and for internal responsibility generally.

Need for such a system is most evident at the Ministry level -- so that the Ministry might have more timely intelligence on the progress being made with JHSCs, and of problems. But there is also a need for methodologies and techniques to be developed for self-evaluation within JHSCs. Basic research on development of evaluation models would contribute to these important needs.

17.2.6 Consultation and the Design of Future Research

Follow-up on the study will be facilitated by consultation with the wider interest groups who may have views on the study report. For that reason, and because of the considerable interest in the report expressed by many of the JHSCs surveyed, dissemination of the report and results can be expected to provide feedback on new research issues raised by the report.

Follow-up should be made the responsibility of a specific group in the Advisory Council (e.g. the Technical Advisory Committee, or a similar body) which would have the responsibility of suggesting a program of follow-up research.

Follow-up and consultation will aid the Advisory Council by sharing widely with the concerned community, the affirmation of great progress made with JHSCs since 1978, and also the many issues and problems which must be addressed, in order to consolidate those gains.

APPENDIX A:
STUDY METHODOLOGY

A.1 INTRODUCTION

Several aspects of the study methodology are described here in detail, particularly: (1) target population and sampling; and (2) the survey process.

A.2 TARGET POPULATION AND SAMPLING

A.2.1 Target Population

The target population for the survey was: all workplaces in Ontario, which are required under the Occupational Health and Safety Act (1978) to have joint health and safety committees, plus workplaces with 20 or more production workers where a committee has been formed voluntarily, or by the Minister's order.** The bulk of this population excludes such workplaces as retail stores and some restaurants, which are exempt under the Act.

A.2.2 Sampling

Overview of the Main Sampling Strategy

A main sampling plan was prepared by SPR Associates for workplaces with 20 or more production workers (and required to have a committee under the Act).* This sampling plan allowed for comparisons of estimates among the following main strata:

- Presence or absence of designated substances.
- Union versus non-union workplaces.
- Five size groups (1-19 workers***; 20-75; 76-249; 250-499; and over 500 workers).

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*This sampling plan adapts portions of a previous sample design prepared by York University Institute for Social Research. Changes from the York sampling plan resulted primarily from the Council's decision to include presence of designated substances as a factor in sampling design.

**The screening survey also included workplaces with fewer than 20 workers where a designated substance applies.

***Applied only to workplaces with designated substances. As is noted below, this group was sampled only in the survey screening phase of the survey, and not in the more detailed committee member survey.

- Mandatory versus voluntary committees, versus committees established under Minister's order.
- 27 SIC (Standard Industrial Classification) groups, which are sub-strata within the main strata noted above.

The overall sampling strata (as shown in Display A.1, next page) consisted of 26 main cells.

The population sampled from, and the number of workplaces sampled, are as shown in Displays A.1 and A.2. (Detailed tables showing population and samples for all cells and SIC groupings are provided in *Design Report for a Study of Joint Health and Safety Committees*, SPR Associates Inc., 1985.)

In total, the main sampling plan called for 2,830 workplaces to be drawn randomly, without replacement, according to a detailed allocation plan. The objective of that allocation was to draw a compromise between: (1) a sample to allow provincial-level estimates; and (2) a "fully crossed" sample with even numbers of cases, to allow more exact estimates for sub-groups, and to allow detailed multiple regression analyses designed to identify factors contributing to success of committees. As well, a separate sample (of an additional 200 workplaces) was surveyed to validate the sampling frame.

Significantly, as can be seen in Displays A.1 and A.2, the final sample tended towards equal numbers of cases within each major stratum (rows or columns of displays).

These stratification data were drawn from the Computer Information Systems of the Industrial Health and Safety Branch, and the Mining Health and Safety Branch, Ontario Ministry of Labour. Actual selection was done within the same information system, with programming assistance provided by the Ministry of Labour.

Blanks in the Sampling Frame

Some errors in the sampling frame were found to occur because of time elapsed in entry of data to the Ministry's information system, and other factors. These included such "blanks" as cases sampled which turned out not to have 20 or more workers, firms that were no longer in business, cases where committees were not required, etc. About 4% blanks were expected in the sample, although the actual percentage found was somewhat higher.

Where "blanks" in the survey sampling frame (cases which should not have been sampled) were identified by the screening survey, they were deleted from the main survey of committee members. This included workplaces " no longer in business", and workplaces with fewer than 20 production workers. Workplaces where a committee is not functioning according to screening survey reports, were treated as "blanks" for purposes of the second (committee member) stage of the survey. Note, however, that the screener data indicating non-existence of committees was included in final study estimates. As well, it should be noted that a 100% sample was taken from smaller cells, such as those for larger workplaces with over 250 employees.

DISPLAY A.1
POPULATION OF WORKPLACES BY MAIN STRATA
FOR SAMPLING OF JOINT HEALTH AND SAFETY COMMITTEES
(Four cells, as noted below, were not sampled in the study)

	Less Than 20 Workers	20 to 74 Workers	75 to 249 Workers	250 to 499 Workers	Over 500 Workers	Total
Workplaces with no designated substances						
Union		1,951	1,092	192	120	3,355
Non-union		1,921	544	65	23	2,553
Workplaces with designated substances						
Union	70	384	456	190	158	1,258
Non-union	484	353	145	35	16	1,033
Workplaces with voluntary committees						
Union		222	73	3	0	298
Non-union		105	45	14	6	170
Totals	554	4,936	2,355	499	323	8,667

DISPLAY A.2
FINAL SAMPLE BY MAIN STRATA, AND THE NUMBER OF
WORKPLACES SELECTED WITHIN EACH CELL
(26 cells sampled, four cells were not examined in the study,
2 cells were sampled only for the screening survey of managers)

	Less Than 20 Workers	20 to 74 Workers	75 to 249 Workers	250 to 499 Workers	Over 500 Workers	Total
Workplaces with no designated substances						
Union		230	230	192	120	772
Non-union		230	230	65	23	548
Workplaces with designated substances						
Union	70	235	231	190	158	884
Non-union	70	234	145	35	16	500
Workplaces with voluntary committees						
Union		36	22	3	0	61
Non-union		50	15	14	6	85
Totals	140	1,015	873	499	323	2,850

A.2.3 Sampling Treatment of Complex Committees

Treatment of Multiple or Tiered Committees

Where more than one committee existed, a sample of committees was selected (e.g. for a committee with one steering committee and 6 sub-committees, the survey included the steering committee and two of the sub-committees (sampling rates were determined after the pilot study)). *This was undertaken by providing a questionnaire to the contact persons for each management and worker contact for the sub-committee.* A special procedure and covering letter was prepared for this purpose.

Treatment of Committees That 'Cross' Between Workplaces

Numerous complexities were identified in the pilot and initial stages of the study. For example, pilot and initial stages of the study revealed that the Ministry's division of workplaces for inspection purposes often differed from industry divisions for purposes of structuring JHSCs. For example: often a firm might have two or more workplaces (by Ministry definition) that were found to be served by a single JHSC. For purposes of this study, these are described as committees that cross between workplaces.

In other cases, a single workplace (by Ministry definition) might be divided into four "divisions" by the firm, each with its own independent JHSC. For purposes of this study, these are described as multiple committees.

Where several workplaces were sampled that are served by one committee, one questionnaire was obtained, but this was weighted to represent each sampled workplace that the committee served. Such "crosses" were identified in the screening survey, and a special letter and procedure were used in follow-up.

Treatment of Multiple Committees

Where more than one committee was found to be in operation, a sample of committees was selected (e.g. for a committee with one steering committee and 6 sub-committees, the survey included the steering committee and perhaps two of the sub-committees (sampling rates were determined after the pilot study)). **This was undertaken by providing a questionnaire to the contact person for each management and worker contact for the sub-committee.** A special procedure and covering letter was prepared for this purpose.

A.2.4 Coverage of the Sample as a Significant Aspect of the Study and Number of Workplaces Studied

Because committees often served a number of workplaces ("crossed" committees as discussed above), the main JHSCs we surveyed actually served a larger number of additional workplaces, and a correspondingly larger number of workers.*

The initial sample of some 3,050 workplaces covered some 720,000 production employees. Our rough estimate is that the final sample covered about 250 workplaces without committees,** and committees serving perhaps 3,800 workplaces with approximately 900,000 production workers.

This "expansion" of the study sample seemed to be especially common for large industrial, mining, health and educational structures, so that the study included a very large proportion of all workers covered by the provision of The Occupational Health & Safety Act (1978) for JHSCs.

A.2.5 Validation of the Sample Frame

One aspect of the sample frame was of special concern to the Advisory Council. This was the exclusion from the sample frame of an unknown number of workplaces, where committees might be required, but might not be in place.

These workplaces are code "X" workplaces within the Ministry information system. Code "X" workplaces encompass a population of about 2,000 where committees are not known to be in existence, because they are:

1. Not required.
2. Committees are not in place although required under the Act.
3. New workplaces, not yet inspected.

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*In comparison, the Ministry of Labour information system covers some 8,600 workplaces with slightly more than one million workers.

**Where no committee existed, or where it had not met for the past 12 months.

To provide validation of the main study sample, a sample of workplaces from this group was included in the survey by extension of the main survey methodology. This validation test included only the screening survey with the main objective being to estimate the number of workplaces which should have committees under the Occupational Health and Safety Act (1978), but where committees may not be in place.

Results showed that:

1. JHSCs existed in about 70% of "X" workplaces, suggesting that a large portion of these workplaces are covered by the Act.
2. A supplementary analysis indicated that some 23.7% of code "X" workplaces without JHSCs are very similar to code "L" workplaces, in type of work done, and thus covered by the Act.

These results suggest that the population of "L" workplaces currently being inspected by the Ministry may "miss" about 1,544 workplaces which are mis-classified as "X" workplaces, or about 17% of all workplaces covered by the Act.*

Other research to compare Inspection Branch files to W.C.B. listings have suggested that the Inspection Branch System misses about 10% of workplaces,** so that the issue of coverage of the target population by the Ministry may be an important one.

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*The estimate of 17% is derived as follows: (1) we assume that approximately 70% of the "X" workplaces (with committees) are covered by the Act (.7 x 2,000 = 1,400); (2) we assume that 24% of "X" workplaces without committees are covered by the Act (.24 x 600 = 144). If 1,544 workplaces are so mis-classified, and are true "L"'s, then 1,544/(1,544 + 8,200) = 16.8%.

**Internal research memo, Ontario Advisory Council on Occupational Health and Occupational Safety, 1982, describing exploratory research on this topic.

A.3 SURVEY PROCESS

A.3.1 Questionnaire Development

Questionnaires for the study were developed from the following three sources:

1. Questions of the Advisory Council and the Technical Advisory Committee regarding the operation of committees.
2. Models of joint health and safety committee processes found in the existing literature* on joint health and safety committees.
3. Observations on joint health and safety committee processes offered by key informants interviewed in the course of background research for the design stage of the study.

Questionnaires were developed through integration of these three streams of questioning by the research team. Subsequently, the questionnaire drafts (and implicit models of the joint health and safety committee process) were reviewed by a three tier supervisory group including representatives of management, labour, the academic community and the public (i.e. Study Technical Advisory Committee, reporting to the Council's Task Force on the Implementation of the Occupational Health and Safety Act, reporting to the Advisory Council itself).

Because the issues involved in joint health and safety committees are complicated, very long and complicated questionnaires resulted (see *Appendix C* for actual questionnaires).

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*Some studies of particular interest included research conducted in Michigan, and the United Kingdom. (See *Section 1.3*, above.)

A.3.2 Pilot Study

A Full Pilot Study

A full-scale pilot study preceded the conduct of the main survey.

The pilot study involved conducting the complete study in reduced format, with 120 workplaces, randomly chosen from across Ontario. As noted below, this involved several mailings to each workplace, with the survey conducted in two stages. Because each workplace generated both a "worker side" and a "management side" for each committee, a total of 165 questionnaires were obtained.

Results of the Pilot Study

Analysis of the pilot study data provided empirical evidence on the workability of specific questions, and also provided an informed basis for assessing the relative value of the many questions being tested. This analysis took the form of:

1. Examining answer distributions, which allowed us to identify questions that do not obtain adequate variance.
2. Testing internal consistency of scales.
3. Examining correlations between questions and "success indicators" to see if predictors show correlations in the expected direction.

A.3.3 Steps in the Main Survey

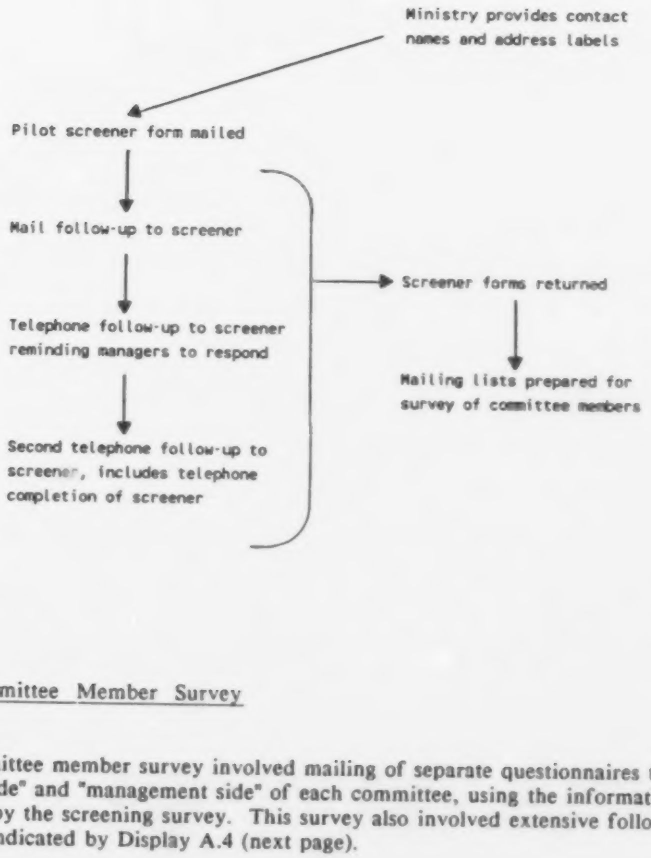
The survey was conducted in two stages, involving two somewhat different surveys: **a screening survey of managers** (to identify preliminary data on committees); and a **main questionnaire survey of committee members.**

The Screening Survey

The screening survey (see *Appendix C* for actual questionnaires) was comprised of a 16 page booklet mailed to the management of the workplace, which was followed up by a variety of mail and telephone reminders, to stimulate the hoped for 90% or greater response rate.

The objective of this survey of management was: to determine that a committee existed; to identify the committee members; to obtain the information required to continue to the next stage (of surveying committee members); and to obtain a small amount of additional information on the committee and the workplace. See Display A.3 for a diagramatic presentation of the screening survey mailings and subsequent follow-ups.

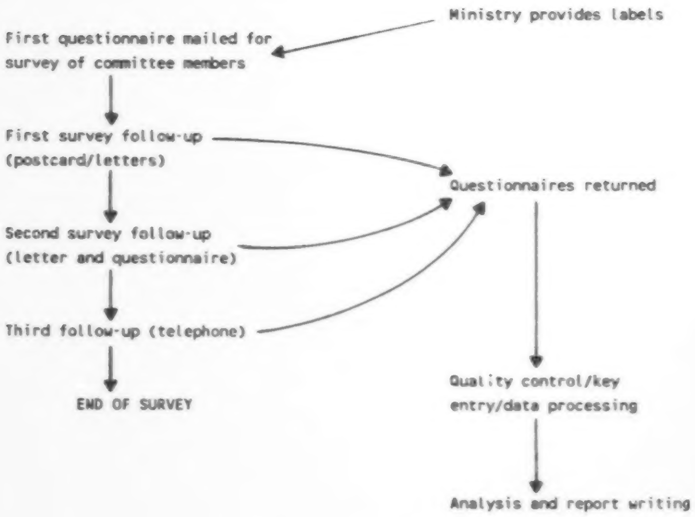
DISPLAY A.3
ACTIVITIES IN THE SCREENING SURVEY


Ministry provides contact names and address labels
Pilot screener form mailed
Mail follow-up to screener
Telephone follow-up to screener reminding managers to respond
Second telephone follow-up to screener, includes telephone completion of screener
Screener forms returned
Mailing lists prepared for survey of committee members

The Committee Member Survey

The committee member survey involved mailing of separate questionnaires to the "worker side" and "management side" of each committee, using the information provided by the screening survey. This survey also involved extensive follow-up, as is indicated by Display A.4 (next page).

DISPLAY A.4
ACTIVITIES IN SURVEY OF COMMITTEE MEMBERS


Ministry provides labels
First questionnaire mailed for survey of committee members
First survey follow-up (postcard/letters)
Questionnaires returned
Second survey follow-up (letter and questionnaire)
Third follow-up (telephone)
END OF SURVEY
Quality control/key entry/data processing
Analysis and report writing

A.3.4 Recording Returns and Computing Response Rates for the Screening Survey

Recording Returns for the Screening Survey

Returns in the screener survey were recorded daily to show:

A. Returns with a committee, ready for survey.

B. Problem returns (where with additional information or correction of errors, the survey could be processed).

C. Refusals.

D. Moved, address unknown.

E. Completed, no committee (no committee exists, or a committee exists but has not met in the past 12 months).

F. Not in business.

G. Other cases.

H. Total returns.

I. Total completed, where completion indicated that either: (1) all information had been provided to allow start of the survey of committee members (categories (A) and (B) above); or (2) that the workplace was not eligible for the main survey of committee members (because it fell into categories (E), or (F) above).

J. New committee.

From time to time, counts were modified by further treatment of a case. For example, a refusal may have been re-contacted and persuaded to respond.

Computing Response Rates for the Screening Survey

The screener completion rate was computed as the percentage which Category I was of the total number of workplaces or management contacts attempted. Where several workplaces were sampled and found to be represented by one committee, a return for the single committee was weighted by the number of workplaces in the sample which were served by the committee.

Recording Returns and Computing Response Rates for the Committee Member Survey

Returns in the committee member survey were recorded daily to show:

A. Completed returns; ready for quality control.

B. Problem returns (where with additional information or correction of errors, the survey could be processed).

C. Refusals.

D. Moved, address unknown.

E. Committee no longer in existence.

F. Workplace no longer "in business".

G. Other cases.

H. Total returns.

I. Total questionnaires completed to date, where completion indicated that either: (1) all information had been provided to allow start of quality control for the survey of committee members; or (2) the workplace was no longer eligible for the survey of committee members because it fell into categories (E), or (F) above.

Computing Response Rates for the Committee Member Survey

The survey completion rate was computed as the percentage which Category I, was of the total number of committee members attempted. Where several sampled workplaces were represented by one committee, a return for the single committee was weighted by the number of sampled workplaces served by the committee (and by correction for management and worker non-response).

A.3.5 Special Problems

Refusals

Refusals were not expected to be a major problem, however, some did occur. These were recorded and dealt with at two levels:

1. First, refusals were sent a special follow-up letter to underline the importance of the study.

If this procedure did not elicit cooperation, respondents were then:

2. Contacted by telephone by a senior interviewer, to explain the study and urge cooperation.

Not in Business/Moved

It was anticipated that most workplaces where the survey mail was returned marked "no longer at this address", were out of business, since usual business practice would allow for forwarding of mail. This was verified in the following ways:

1. The Ministry of Labour was asked to provide an update from paper files on workplaces that appear or which had not responded to three survey contacts.
2. The survey team attempted its own verification, tracing the workplace by telephone, and checking publications which list company closings and bankruptcies.

Language Problems

Language problems were identified through calls to the survey office, and through probes on difficulties with the survey when telephone reminder calls were made to non-respondents.

Procedures for dealing with language problems varied, depending upon the scope of problems. Scope of problems had been minor in the pilot screener, but some greater problems were anticipated in the committee member portion of the survey. The procedure followed was to first determine if another member of the committee could assist with completion of the survey, and if necessary, offer a bilingual interview by telephone.

Other Problems

Difficulty of contacting workers was a particular problem as noted in *Section 2.3.3*, above.

Other problems which arose in the course of the survey were cases where individuals were ill, or where all of the committee members were new. When this occurred, each case was dealt with on an individual basis.

A.4 THE SURVEY QUESTIONNAIRES

A.4.1 Background: A Model of Joint Health and Safety Committee (JHSC) Functioning

Because the survey was designed to address many questions regarding the functioning of committees (i.e. what makes them effective), the survey attempted to capture extensive detail on the structural form of committees, what they actually do, and also information on the workplace generally.

Numerous important issues were addressed, including attitudinal dimensions, perceived economic performance of (private sector) workplaces surveyed, and labour relations environment.

Nevertheless, a few themes emerged. The literature on JHSCs is extremely limited and derived from only a few very exploratory studies. The literature on joint health and safety committees places great emphasis on the role of senior management in supporting joint health and safety committees, and the literature suggests that a parallel role may exist for workers' support (and support of unions in organized workplaces). Therefore, these factors were also addressed.

Overall, the questionnaires reflected a model of the joint health and safety committee processes shown in Section 1.3 of the main report (Display 1.2, page 13).

A.4.2 The Screening Survey Questionnaire

The screening survey questionnaire was designed to obtain basic descriptive information about committees and the workplace, and most importantly, to identify the members of the committee for later selection of the individuals to receive the committee member questionnaire. The questionnaire was directed at management, and information obtained in its main sections included:

1. Whether or not a committee existed with at least one worker and one management member, and how often the committee met.
2. Management and worker members, chairmanship, number of members from each side, length of time on committee.
3. Age of committee, whether established voluntarily or by collective bargaining, sub-committee structure, coverage of multiple workplaces.
4. Age of workplace, size of workforce and seasonal variations, existence of union or employee association, number of unions and percentage of employees unionized.

Overall, the screening survey obtained considerable information, and constituted a major survey regarding joint health and safety committees in and of itself. This was a major expansion of its role in the study, since the screening survey was originally conceived of only as a mechanism for identifying committee members. (See *Appendix C.* for the actual screening questionnaire.)

A.4.3 Questionnaire for Committee Members

The committee member questionnaire was organized into Sections "A" to"Q", as is illustrated in Display 2.2 of the main report, page 25.

Survey indicators were provided for a broad list of variables suggested by previous studies: characteristics of the workplace and JHSC members; committee activities (meetings, inspections, investigations); perceived outcomes; and areas where it was felt that JHSCs needed improvement. These were developed using a wide range of questions including simple descriptive questions, attitudinal ratings, and so on.

The actual questionnaires are provided in *Appendix C. Section C.2: Questionnaire for Management Members of Committees;* and *Appendix C. Section C.3: Questionnaire for Worker Members of Committees.*

A.5 DATA ANALYSIS

All statistical data processing for the study was completed using the Statistical Package for the Social Sciences (SPSSPC+), microcomputer version.

For details on this system, see: *SPSS/PC+ for the IBM PC/XT/AT*, SPSS Inc., 1985; and *Advanced Statistics: SPSS/PC+ for the IBM PC/XT/AT*, SPSS Inc., 1985.

APPENDIX B:
REGRESSION ANALYSES AND INDICATORS

B.1 OVERVIEW OF REGRESSION ANALYSES

B.1.1 Method

Multiple regression was chosen as the main approach to analysis of impacts, mainly to allow the treatment of a large number of predictive variables within a comprehensive analytic framework. Generally, the pattern of correlations among variables was similar using Pearson's r, as opposed to non-parametric correlations, so that the assumption of suitability of the technique to measurement level of the data, is seen to be reasonable.

All multi-item indicators used as variables were comprised of standardized item scores. (See *Section B.3* for composition by items and reliabilities for indicators with 4 or more items.)

All regressions were ordinary least squares, with simultaneous entry of all variables, the variables entered being as indicated in Displays B.2 to B.5. Multi-colinearity was seen as a minor concern, since most indicators were derived from separate factor analyses and therefore, few very high correlations, existed among independent variables.

Separate analyses were conducted for workers and managers, and for unionized and non-unionized workplaces and for workplaces with designated substances (for action on designated substances regressions). In all, the analysis called for 40 major regression analyses, which are discussed in Chapters 11, 12, and 13.

B.1.2 Reliability of Regression Results

Good reliability was evidenced by similarity of results across regressions. In each area (functioning and success/impact of committees), some low R-squares were noted, along with some very good R-squares. (Adjusted R-squares declined only very slightly because of the large sample size.)

We hypothesized that this phenomena of some low R-squares could be attributed to less reliability of some indicators with low R-squares, and to distributions depressing coefficients, but felt this should be verified.

For this reason we conducted additional tests. We tested the reliability of our variables identified as basic regression predictors by testing their predictive power using another statistical model: discriminant analysis.

Discriminant analysis* predictions were made for the eight basic analyses of success/impact indicators, for management and workers, using as predictors, the variables which had significant coefficients in the regression analysis. Overall, the results pointed to fairly good predictive power for all 8 basic prediction problems, as illustrated in Display B.1 (below). These predictive models were able to correctly classify JHSCs as high or low success committees about 70% to 75% of the time, using the predictive variables drawn from the regression results. These better predictions generally applied well to all 8 models tested. Our conclusion therefore is that the regression results are stable, statistically significant and predictively useful.

Clearly, the results are limited in certain ways: (1) 70% - 75% predictive power is very good (especially for a first major study), but could be improved. There is much more to learn, and (2) causal implications should be developed in future research, including longitudinal studies. The regressions therefore are regarded as providing valid insights on working of JHSCs, and at the same time, direction for future research.

DISPLAY B.1
PREDICTIONS OF PERCEIVED SUCCESS/IMPACT
USING DISCRIMINANT ANALYSIS
(Total % of JHSCs correctly classified)

Variable Predicted	Management Members	Worker Members
Evaluation of Perceived success/impact of the JHSC on 5 dimensions	74.2%	77.6%
Rating of success of inspections	71.4	73.6
Five year improvement (reduced danger etc.)	64.5	69.0
Overall evaluation of the JHSCs' impact in improving protection of workers	72.1	77.3

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*Discriminant analysis is a multi-variate statistical technique commonly used to classify individuals or other units of analysis into mutually exclusive groups such as "successful JHSCs" and "unsuccessful JHSCs". This is done using a predictive model somewhat related to multiple regression. A major difference is that discriminant analysis "groups" result in its predictions, classifying the units being analyzed, as to probable group membership. Technically, the technique involves estimation of an optimal linear discriminant function. See: *Advanced Statistics: SPSS/PC+*, SPSS Inc., Chicago, 1985.

B.2 Regression Tables

DISPLAY B.2
MODEL OF FACTORS INFLUENCING FUNCTIONING OF JOINT HEALTH AND SAFETY COMMITTEES
(MANAGEMENT DATA)
(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)			
	MIN#31	M101	MIN#35(D)	MIN#37
FIRM CHARACTERISTICS				
International operation	.11*	NS	NS	NS
Canada-wide operation	NS	NS	NS	NS
Ontario-wide operation	NS	NS	NS	NS
Size of workplace	NS	.06*	NS	-.05
Government workplace	NS	NS	NS	NS
Non-profit workplace	NS	NS	NS	NS
Private sector	NS	.12*	NS	NS
Workplace Complexity/Size (MIN#01)	NS	NS	NS	NS
Health & Safety Program (MIN#16/W222)	.21*	NS	NS	NS
Economic Strength (MIN#17)	NS	NS	NS	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	.05	NS	NS
High Worker Turnover (M236)	NS	NS	NS	NS
Highly Experienced Workforce (M237)	NS	NS	NS	NS
MANAGEMENT CHARACTERISTICS				
Management Health & Safety Orientation (WIN#14/MIN#14)	NS	NS	NS	.07*
Management Health & Safety/Labour Relations Overlap (MIN#26)	.05	.08*	NS	-.09*
LABOUR CHARACTERISTICS				
Worker Health & Safety Orientation (WIN#15/MIN#15)	NS	NS	NS	-.07
Unionized or Not (M246/W246)	.07*	NS	NS	-.07*
Union Approach to Collective Bargaining (MIN#25) (U)	NS	NS	NS	NS
Number of Unions (M246a/W246a) (U)	NS	NS	NS	NS
CHARACTERISTICS OF MINISTRY ACTIVITY				
Frequency of Inspection (M264/W264)	NS	NS	NS	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	.08*	NS	NS	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	.06*	NS	.12*	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS	.08	NS

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only.

(D) signifies derived from separate regressions for only workplaces with designated substances present.

(A) MIN#31 = management indicator of institutionalization of JHSC process;
M101 = management reports on frequency of inspections;
MIN#35 = management reports on action on designated substances;
MIN#37 = management reports on positive quality of committee relationships.
(see Section B.3 for details on indicators).

DISPLAY B.2 (CONT'D)

	Indicators (A)			
	MIN#31	M101	MIN#35(D)	MIN#37
INDUSTRIAL RELATIONS CLIMATE				
Labour Relations Climate (MIN#18/WIN#18)	-.05	-.05	NS	.34*
LEVEL OF DANGER				
Perceived Danger (MIN#20/WIN#20)	.06*	NS	.08	NS
Presence of Designated Substances (MIN#12/WIN#12)	NS	NS	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	.07*	NS	NS	-.05
COMMITTEE STRUCTURE				
Committee Coverage (MIN#02)	NS	.09*	NS	NS
% Management Members on JHSC (M025A)	NS	NS	NS	NS
COMMITTEE MEMBERS				
MLONE (only one management committee member)	NS	NS	NS	NS
Age of Committee (CAGE)	.06*	NS	NS	-.06*
Worker Member Health & Safety Orientations (MIN#08)	.05	.09*	NS	.17*
Management Member Scope of Training (MIN#04)	.14	.07	.08	NS
Senior Management on JHSC (M026)	NS	NS	NS	NS
Mid-Level Management on JHSC (M027)	.06*	NS	NS	NS
Safety Directors on JHSC (M028)	NS	NS	NS	NS
% Attendance Management Members (M089A)	NS	NS	.09	NS
Management Members Can Agree to Recommendations on Own (M165)	NS	NS	NS	-.04
Worker/Manager Training Combined (M060)	NS	NS	NS	.09*
Management Members Average Length of Time on Committee (MAVE)	NS	NS	NS	.05
RESOURCES				
Satisfaction With Information (MIN#11/WIN#11)	NS	NS	.11*	.10*
Scope of Information (WIN#10)				
FORMAL MANDATE AND DECISION-MAKING				
Written Responsibilities for JHSC (M015)	.05	.07*	.11*	NS
R	.53	.36	.37	.55
R-Square	.28	.13	.14	.31
Adjusted R-Square	.27	.12	.10	.29

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only.

(D) signifies derived from separate regressions for only workplaces with designated substances present.

(A) MIN#31 = management indicator of institutionalization of JHSC process;
M101 = management reports on frequency of inspections;
MIN#35 = management reports on action on designated substances;
MIN#37 = management reports on positive quality of committee relationships.
(see Section B.3 for details on indicators).

DISPLAY B.3

MODEL OF FACTORS INFLUENCING FUNCTIONING OF JOINT HEALTH AND SAFETY COMMITTEES

(WORKER DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators			
	WIN#31	W101	WIN#35(D)	WIN#37
FIRM CHARACTERISTICS				
Health & Safety Program (MIN#16/W222)	.14*	.10*	NS	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS	NS	-.07*
Size of Workplace	NS	NS	NS	NS
MANAGEMENT CHARACTERISTICS				
Management Health & Safety Orientation (WIN#14/MIN#14)	NS	NS	NS	.08*
Management Approach to Collective Bargaining (WIN#24) (U)	NS	NS		NS
LABOUR CHARACTERISTICS				
Worker Health & Safety Orientation (WIN#15/MIN#15)	NS	NS	NS	-.06*
Unionized or Not (M246/W246)	.06*	NS	NS	NS
Union Health & Safety Resources (WIN#22) (U)**	.06	NS		NS
Union Health & Safety Orientation (WIN#23) (U)	NS	.09*		NS
Health & Safety Union Labour Relations Overlap (WIN#27) (U)	NS	NS		NS
Number of Unions (M246a/W246a) (U)	NS	NS		NS
Frequency of Worker Members' Reports to Union (W321) (U)	.11*	.10*		.08*
CHARACTERISTICS OF MINISTRY ACTIVITY				
Frequency of Inspection (M264/W264)	NS	.13*	NS	-.04
Ministry JHSC Linkages (MIN#21A/WIN#21A)	.09*	.09*	NS	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	.10*	NS	.07	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS	NS	NS
INDUSTRIAL RELATIONS CLIMATE				
Labour Relations Climate (MIN#18/WIN#18)	NS	NS	NS	.38*
LEVEL OF DANGER				
Perceived Danger (MIN#20/WIN#20)	NS	NS	NS	NS
Presence of Designated Substances (MIN#12/WIN#12)	.05	.06	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	.05	NS	NS	NS

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) WIN#31 = worker indicator of institutionalization of JHSC process;
W101 = worker reports on frequency of inspections;
WIN#35 = worker reports on action on designated substances;
WIN#37 = worker reports on positive quality of committee relationships.
(see Section B.3 for details on indicators).

DISPLAY B.3 (CONT'D)

	Indicators			
	WIN#31	W101	WIN#35(D)	WIN#37
COMMITTEE STRUCTURE				
% Worker Members on JHSC (W031A)	NS	NS	NS	NS
COMMITTEE MEMBERS				
WLONE (only one worker member)	-.08*	NS	NS	NS
Age of Committee (CAGE)	NS	.07*	NS	-.05*
Management Member Health & Safety Orientations (WIN#09)	.11*	.08*	.14*	.25*
Worker Member Scope of Training (WIN#05)	.18*	.17*	.09*	-.04
# Attendance Worker Members (W088A)	NS	NS	NS	NS
Worker Members Can Agree to Recommendations On Own (W166)	NS	NS	NS	NS
Worker Members Average Length of Time on Committee (WAVE)	-.06	NS	NS	NS
RESOURCES				
Satisfaction With Information (MIN#11/WIN#11)	.14*	NS	NS	.14*
Scope of Information (WIN#10)	.12	NS	.22*	NS
R	.58	.35	.44	.73
R-Square	.34	.12	.19	.53
Adjusted R-Square	.33	.11	.17	.52

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) WIN#31 = worker indicator of institutionalization of JHSC process;
W101 = worker reports on frequency of inspections;
WIN#35 = worker reports on action on designated substances;
WIN#37 = worker reports on positive quality of committee relationships.
(see Section B.3 for details on indicators).

DISPLAY B.4

MODEL OF FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES

(MANAGEMENT DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)			
	MIN#45	M117	MIN#43	M292
FIRM CHARACTERISTICS				
Workplace Complexity/Size (MIN#01)	NS	NS	.06	NS
Health & Safety Program (MIN#16/W222)	NS	NS	NS	NS
Economic Strength (MIN#17)	.06*	NS	.05	.04
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS	NS	NS
High Worker Turnover (M236)	NS	NS	NS	NS
Highly Experienced Workforce (M237)	NS	NS	NS	NS
International Operation	NS	NS	NS	-.05
Canada-wide Operation	NS	NS	NS	-.07*
Ontario-wide Operation	NS	NS	NS	NS
Size of Workplace	NS	NS	NS	NS
Government Workplace	NS	NS	NS	NS
Non-Profit Workplace	NS	NS	NS	NS
Private Sector	NS	NS	NS	NS
MANAGEMENT CHARACTERISTICS				
Management Health & Safety Orientation (WIN#14/MIN#14)	.18*	.08*	.13*	NS
Management Health & Safety/Labour Relations Overlap (MIN#26)	NS	NS	.06	NS
LABOUR CHARACTERISTICS				
Worker Health & Safety Orientation (WIN#15/MIN#15)	.22*	NS	NS	.17*
Unionized or Not (M246/W246)	NS	NS	NS	.05
Union Approach to Collective Bargaining (MIN#25) (U)	NS	NS	NS	NS
Number of Unions (M246a/W246a) (U)	NS	NS	NS	NS
Frequency of Worker Members' Reports to Union (W321) (U)				
CHARACTERISTICS OF MINISTRY ACTIVITY				
Frequency of Inspection (M264/W264)	NS	NS	.10*	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	NS	NS	NS	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	.06*	NS	.07*	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS	NS	NS
Management Appeals Ministry Orders (W271/M271)	NS	NS	NS	NS
Workers Appeal Ministry Orders (W272/M272)	NS	NS	NS	NS

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) MIN#45 = evaluation of JHSC success/impact on 5 dimensions;
M117 = rating of success of inspections;
MIN#43 = 5 year improvements (reduced danger, etc.)
M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.4 (CON'T)

	Indicators (A)			
	MIN#45	M117	MIN#43	M292
INDUSTRIAL RELATIONS CLIMATE				
Labour Relations Climate (MIN#18/WIN#18)	.05	NS	.08*	.07*
LEVEL OF DANGER				
Perceived Danger (MIN#20/WIN#20)	-.11*	NS	-.11*	-.08*
Presence of Designated Substances (MIN#12/WIN#12)	-.04	NS	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	NS	NS	NS	-.07*
COMMITTEE STRUCTURE				
Committee Coverage (MIN#02)	NS	NS	NS	NS
Centralized Committee Authority (MIN#33/WIN#33)	NS	NS	-.05*	NS
% Management Members on JHSC (M025A)	NS	-.05	NS	NS
COMMITTEE MEMBERS				
Age of Committee (CAGE)	NS	NS	NS	NS
Worker Member Health & Safety Orientations (MIN#08)	.15*	.34*	NS	.13*
Management Member Scope of Training (MIN#04)	NS	NS	NS	NS
Senior Management on JHSC (M026)	NS	NS	NS	.07*
Mid-Level Management on JHSC (M027)	NS	NS	NS	NS
Safety Directors on JHSC (M028)	.04	NS	NS	NS
% Attendance Management Members (M089A)	NS	NS	NS	NS
Management Members Can Agree to Recommendations on Own (M165)	NS	NS	NS	NS
Worker/Manager Training Combined (M060)	NS	NS	NS	NS
Management Members Average Length of Time on Committee (MAVE)	NS	NS	NS	NS
Management Member Hours/Month on JHSC Business (M090)	NS	NS	NS	NS
RESOURCES				
Satisfaction With Information (MIN#11/WIN#11)	.09	.15*	NS	.06
FORMAL MANDATE AND DECISION-MAKING				
Written Responsibilities for JHSC (M015)	NS	NS	NS	NS
Perceived Worker Influence in the JHSC (MIN#34/WIN#34)	NS	NS	NS	.05*
JHSC is a Decision-Making Body (M022/W022)	.05*	NS	.04	.06*

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) MIN#45 = evaluation of JHSC success/impact on 5 dimensions;
M117 = rating of success of inspections;
MIN#43 = 5 year improvements (reduced danger, etc.);
M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.4 (CON'T)

	Indicators (A)			
	MIN#45	M117	MIN#43	M292
COMMITTEE ACTIVITIES AND FUNCTIONING				
Institutionalization of Committee Process (MIN#31/WIN#31)	.05	.05	.07*	.07*
Scope of Committee Activity (WIN#03/MIN#03)	.08*	NS	.06	.05
Legal Response to Investigations (WIN#29/MIN#29)	NS	NS	NS	NS
Action on Designated Substances (MIN#35/WIN#35) (D)	NS	NS	.07	NS
Action on Other Hazards (WIN#36/MIN#36) (D)	NS	NS	NS	NS
Frequency of Inspections (M101/W101)	.04	NS	.06*	.06*
Positive Committee Relationships (MIN#37/WIN#37)	.08*	.09	.08*	.10*
Length of JHSC Meetings (M075)	NS	NS	NS	NS
Extra Meetings Called When Needed (W074/M074)	NS	NS	NS	NS
Meeting Attendance (MIN#38/WIN#38)	NS	NS	NS	.04
COMMITTEE PROCESS				
Problem Solving Behaviour (WIN#39/MIN#39)	NS	NS	NS	NS
Negotiating Behaviour (WIN#40/MIN#40)	NS	NS	NS	NS
DISPUTES				
MOL Called to Resolve Assessment Problems (M156)	NS	NS	NS	.05
R	.68	.59	.44	.56
R-Square	.46	.35	.20	.31
Adjusted R-Square	.44	.33	.17	.29

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) MIN#45 = evaluation of JHSC success/impact on 5 dimensions;
M117 = rating of success of inspections;
MIN#43 = 5 year improvements (reduced danger, etc.);
M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.5

MODEL OF FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES

(WORKER DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)			
	WIN#45	W117	WIN#43	W292
FIRM CHARACTERISTICS				
Health & Safety Program (MIN#16/W222)	.04	NS	NS	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS	NS	NS
Size of Workplace	NS	NS	-.06*	.04
MANAGEMENT CHARACTERISTICS				
Management Health & Safety Orientation (WIN#14/MIN#14)	.15*	NS	.13*	NS
Management Approach to Collective Bargaining (WIN#24)	NS	NS	NS	NS
LABOUR CHARACTERISTICS				
Worker Health & Safety Orientation (WIN#15/MIN#15)	.19*	.13*	.08*	.13*
Unionized or Not (M246/W246)	NS	.05	.05	NS
Union Health & Safety Resources (WIN#22) (U)	NS	NS	NS	NS
Union Health & Safety Orientation (WIN#23) (U)	.09*	.10*	NS	.09*
Health & Safety Union Labour Relations Overlap (WIN#27) (U)	NS	NS	NS	-.07*
Number of Unions (M246a/W246a) (U)	NS	NS	NS	NS
Frequency of Worker Members' Reports to Union (W321) (U)	NS	NS	NS	NS
INDUSTRIAL RELATIONS CLIMATE				
Labour Relations Climate (MIN#18/WIN#18)	.08*	NS	.12*	.07*
LEVEL OF DANGER				
Perceived Danger (MIN#20/WIN#20)	-.11*	NS	-.08*	-.11*
Presence of Designated Substances (MIN#12/WIN#12)	NS	NS	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	NS	NS	NS	NS
COMMITTEE STRUCTURE				
Centralized Committee Authority (MIN#33/WIN#33)	NS	NS	NS	NS
% Worker Members on JHSC (W031A)	NS	NS	NS	NS

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) WIN#45 = evaluation of JHSC success/impact on 5 dimensions;
W117 = rating of success of inspections;
WIN#43 = 5 year improvements (reduced danger, etc.)
W292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY 8.5 (CON'T)

	Indicators (A)			
	WIN#45	W117	WIN#43	W292
COMMITTEE MEMBERS				
WLONE (only one worker committee member)	NS	NS	NS	NS
Age of Committee (CAGE)	NS	NS	NS	NS
Management Member Health & Safety Orientations (WIN#09)	.15*	.21*	NS	.11*
Worker Member Scope of Training (WIN#05)	NS	NS	NS	NS
Worker Members Can Agree to Recommendations On Own (W166)	NS	.07*	NS	NS
Worker Members Average Length of Time on Committee (WAVE)	NS	NS	NS	NS
Worker Member Hours/Month on JHSC Business (W091)	NS	NS	NS	NS
RESOURCES				
Satisfaction With Information (MIN#11/WIN#11)	.12*	.16*	NS	.10*
Scope of Information (WIN#10)	NS	NS	NS	NS
FORMAL MANDATE AND DECISION-MAKING				
Perceived worker Influence in the JHSC (MIN#34/WIN#34)	.05*	.06*	NS	NS
JHSC is a Decision-Making Body (M022/W022)	.06*	NS	.05*	.06*
COMMITTEE ACTIVITIES AND FUNCTIONING				
Management Control of Chair-Process (WIN#32)	NS	NS	NS	NS
Institutionalization of Committee Process (MIN#31/WIN#31)	.05*	.13*	.07*	.14*
Scope of Committee Activity (WIN#03/MIN#03)	NS	NS	NS	NS
Legal Response to Investigations (WIN#29/MIN#29)	NS	.06*	NS	NS
Frequency of Inspections (M101/W101)	.04	NS	.06*	.04
Positive Committee Relationships (MIN#37/WIN#37)	.12*	.11*	.14*	.13*
# Times Worker Members Meet Non-JHSC Workers (W207)	NS	NS	NS	.05
Extra Meetings Called When Needed (W074/M074)	NS	NS	NS	NS
Meeting Attendance (MIN#38/WIN#38)	NS	NS	NS	NS
CHARACTERISTICS OF MINISTRY ACTIVITY				
Frequency of Inspection (M264/W264)	NS	NS	.04	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	NS	NS	.08*	.04
Ministry Inspector Proactive (MIN#21/WIN#21)	.05*	NS	.05	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS	NS	-.05*
Management Appeals Ministry Orders (W271/M271)	NS	NS	NS	NS
Workers Appeal Ministry Orders (W272/M272)	NS	NS	NS	NS

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) WIN#45 = evaluation of JHSC success/impact on 5 dimensions;
W117 = rating of success of inspections;
WIN#43 = 5 year improvements (reduced danger, etc.);
W292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.5 (CON'T)

	Indicators (A)			
	WIN#45	W117	WIN#43	W292
COMMITTEE PROCESS				
Problem-Solving Behaviour (WIN#39/MIN#39)	NS	NS	NS	NS
Negotiating Behaviour (WIN#40/MIN#40)	NS	.11*	NS	NS
Worker Members Meet Before JHSC (W098)	.04*	.06*	.04	.04
Workers Suspended/Fired for Work Refusals (W120)	NS	NS	NS	NS
DISPUTES				
Frequency MOL Called to Resolve Work Refusals (W121)	NS	NS	NS	NS
R	.76	.58	.58	.67
R-Square	.58	.34	.33	.45
Adjusted R-Square	.57	.32	.32	.43

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(D) signifies derived from separate regressions for only workplaces with designated substances present;

(A) WIN#45 = evaluation of JHSC success/impact on 5 dimensions;
W117 = rating of success of inspections;
WIN#43 = 5 year improvements (reduced danger, etc.);
W292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.6

MODEL OF FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES IN WORKPLACES WITH POOR LABOUR RELATIONS

(MANAGEMENT DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)	
	MIN#43	M292
FIRM CHARACTERISTICS		
Workplace Complexity/Size (MIN#01)	NS	NS
Health & Safety Program (MIN#16/W222)	NS	NS
Economic Strength (MIN#17)	NS	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS
High Worker Turnover (M236)	NS	NS
Highly Experienced Workforce (M237)	.07	NS
International Operation	NS	NS
Canada-wide Operation	NS	NS
Ontario-wide Operation	-.08	NS
Size of Workplace	-.08	NS
Government Workplace	NS	NS
Non-Profit Workplace	NS	NS
Private Sector	NS	NS
MANAGEMENT CHARACTERISTICS		
Management Health & Safety Orientation (WIN#14/MIN#14)	NS	NS
Management Health & Safety/Labour Relations Overlap (MIN#26)	NS	NS
LABOUR CHARACTERISTICS		
Worker Health & Safety Orientation (WIN#15/MIN#15)	NS	.14*
Unionized or Not (M246/W246)	NS	NS
Union Approach to Collective Bargaining (MIN#25) (U)	NS	NS
Number of Unions (M246a/W246a) (U)	NS	NS
CHARACTERISTICS OF MINISTRY ACTIVITY		
Frequency of Inspection (M264/W264)	.11*	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	NS	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	.08*	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS
Management Appeals Ministry Orders (W271/M271)	NS	NS
Workers Appeal Ministry Orders (W272/M272)	NS	NS
INDUSTRIAL RELATIONS CLIMATE		
Labour Relations Climate (MIN#18/WIN#18)	NS	.08*
LEVEL OF DANGER		
Perceived Danger (MIN#20/WIN#20)	-.12*	NS
Presence of Designated Substances (MIN#12/WIN#12)	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	NS	NS

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(A) MIN#43 = 5 year improvements (reduced danger, etc.)
M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.6 (CON'T)

	Indicators (A)	
	MIN#43	M292
COMMITTEE STRUCTURE		
Committee Coverage (MIN#02)	NS	NS
Centralized Committee Authority (MIN#33/WIN#33)	-.09*	NS
% Management Members on JHSC (M025A)	NS	NS
COMMITTEE MEMBERS		
Age of Committee (CAGE)	NS	NS
Worker Member Health & Safety Orientations (MIN#08)	NS	.17*
Management Member Scope of Training (MIN#04)	NS	NS
Senior Management on JHSC (M026)	NS	.08*
Mid-Level Management on JHSC (M027)	NS	NS
Safety Directors on JHSC (M028)	NS	NS
% Attendance Management Members (M089A)	NS	NS
Management Members Can Agree to Recommendations on Own (M165)	NS	NS
Worker/Manager Training Combined (M060)	NS	NS
Management Members Average Length of Time on Committee (MAVE)	NS	.07
Management Member Hours/Month on JHSC Business (M090)	NS	NS
RESOURCES		
Satisfaction With Information (MIN#11/WIN#11)	.09*	.07
FORMAL MANDATE AND DECISION-MAKING		
Written Responsibilities for JHSC (M015)	NS	NS
Perceived Influence (MIN#34/WIN#34)	NS	.06
JHSC is a Decision-Making Body (M022/W022)	.07	.08*
COMMITTEE ACTIVITIES AND FUNCTIONING		
Institutionalization of Committee Process (MIN#31/WIN#31)	.10*	.07
Scope of Committee Activity (WIN#03/MIN#03)	.07	NS
Legal Response to Investigations (WIN#29/MIN#29)	NS	.06
Frequency of Inspections (M101/W101)	NS	NS
Positive Committee Relationships (MIN#37/WIN#37)	.10*	.15*
Length of JHSC Meetings (M075)	NS	NS
Extra Meetings Called When Needed (W074/M074)	NS	NS
Meeting Attendance (MIN#38/WIN#38)	NS	NS
COMMITTEE PROCESS		
Problem Solving Behaviour (WIN#39/MIN#39)	NS	NS
Negotiating Behaviour (WIN#40/MIN#40)	NS	NS
DISPUTES		
MOL Called to Resolve Assessment Problems (M156)	NS	.07
R	.43	.56
R-Square	.19	.31
Adjusted R-Square	.14	.27

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(A) MIN#43 = 5 year improvements (reduced danger, etc.)
M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.7
MODEL OF FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES IN WORKPLACES WITH POOR LABOUR RELATIONS
(WORKER DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)	
	WIN#43	W292
FIRM CHARACTERISTICS		
Health & Safety Program (MIN#16/W222)	NS	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS
Size of Workplace	NS	NS
MANAGEMENT CHARACTERISTICS		
Management Health & Safety Orientation (WIN#14/MIN#14)	.15*	.12*
Management Approach to Collective Bargaining (WIN#24)		
LABOUR CHARACTERISTICS		
Worker Health & Safety Orientation (WIN#15/MIN#15)	.08	.12*
Unionized or Not (M246/W246)	NS	.06*
Union Health & Safety Resources (WIN#22) (U)	NS	NS
Union Health & Safety Orientation (WIN#23) (U)	.07	.07
Health & Safety Union Labour Relations Overlap (WIN#27) (U)	NS	-.10
Number of Unions (M246a/W246a) (U)	NS	NS
Frequency of Worker Members' Reports to Union (W321) (U)	.07	NS
INDUSTRIAL RELATIONS CLIMATE		
Labour Relations Climate (MIN#18/WIN#18)	.08	NS
LEVEL OF DANGER		
Perceived Danger (MIN#20/WIN#20)	-.10*	-.10*
Presence of Designated Substances (MIN#12/WIN#12)	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	NS	NS
COMMITTEE STRUCTURE		
Centralized Committee Authority (MIN#33/WIN#33)	NS	NS
% Worker Members on JHSC (W031A)	NS	NS
COMMITTEE MEMBERS		
WLONE (only one worker committee member)	NS	NS
Age of Committee (CAGE)	NS	NS
Management Member Health & Safety Orientations (WIN#09)	NS	.11*
Worker Member Scope of Training (WIN#05)	NS	NS
Worker Members Can Agree to Recommendations On Own (W166)	NS	NS
Worker Members Average Length of Time on Committee (WAVE)	NS	NS
Worker Member Hours/Month on JHSC Business (W091)	NS	NS

*Significant at P = .01 or better.
(U) signifies derived from separate regressions for unionized workplaces only;
(A) WIN#43 = 5 year improvements (reduced danger, etc.)
W292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.7 (CON'T)

	Indicators (A)	
	WIN#43	W292
RESOURCES		
Satisfaction With Information (MIN#11/WIN#11)	NS	.08
Scope of Information ((WIN#20)	NS	NS
FORMAL MANDATE AND DECISION-MAKING		
Perceived Influence (MIN#34/WIN#34)	NS	NS
JHSC is a Decision-Making Body (M022/W022)	.06	NS
COMMITTEE ACTIVITIES AND FUNCTIONING		
Management Control of Chair-Process (WIN#32)	NS	NS
Institutionalization of Committee Process (MIN#31/WIN#31)	.08	.16*
Scope of Committee Activity (WIN#03/MIN#03)	NS	NS
Legal Response to Investigations (WIN#29/MIN#29)	NS	.06
Frequency of Inspections (M101/W101)	.07	.06
Positive Committee Relationships (MIN#37/WIN#37)	.15*	.12*
# Times Worker Members Meet Non-JHSC Workers (W207)	NS	.07
Extra Meetings Called When Needed (W074/M074)	NS	NS
Meeting Attendance (MIN#38/WIN#38)	NS	NS
CHARACTERISTICS OF MINISTRY ACTIVITY		
Frequency of Inspection (M264/W264)	NS	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	.10*	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	NS	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	-.06
Management Appeals Ministry Orders (W271/M271)	NS	NS
Workers Appeal Ministry Orders (W272/M272)	NS	NS
COMMITTEE PROCESS		
Problem Solving Behaviour (WIN#39/MIN#39)	NS	NS
Negotiating Behaviour (WIN#40/MIN#40)	NS	NS
Worker Members Meet Before JHSC (W098)	NS	NS
Workers Suspended/Fired for Work Refusals (W120)	NS	NS
DISPUTES		
Frequency MOL Called to Resolve Work Refusals (W121)	NS	NS
R	.53	.63
R-Square	.28	.40
Adjusted R-Square	.25	.37

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(A) WIN#43 = 5 year improvements (reduced danger, etc.)
W292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.8

MODEL OF FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES IN DANGEROUS WORKPLACES

(MANAGEMENT DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)	
	MIN#43	M292
FIRM CHARACTERISTICS		
Workplace Complexity/Size (MIN#01)	NS	NS
Health & Safety Program (MIN#16/W222)	NS	NS
Economic Strength (MIN#17)	.07	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS
High Worker Turnover (M236)	NS	NS
Highly Experienced Workforce (M237)	NS	NS
International Operation	NS	NS
Canada-wide Operation	NS	-.06
Ontario-wide Operation	NS	NS
Size of Workplace	NS	NS
Government Workplace	NS	NS
Non-Profit Workplace	NS	NS
Private Sector	NS	NS
MANAGEMENT CHARACTERISTICS		
Management Health & Safety Orientation (WIN#14/MIN#14)	.14*	NS
Management Health & Safety/Labour Relations Overlap (MIN#26)		
LABOUR CHARACTERISTICS		
Worker Health & Safety Orientation (WIN#15/MIN#15)	NS	.12*
Unionized or Not (M246/W246)	NS	NS
Union Approach to Collective Bargaining (MIN#25) (U)	NS	NS
Number of Unions (M246a/W246a) (U)	NS	NS
CHARACTERISTICS OF MINISTRY ACTIVITY		
Frequency of Inspection (M264/W264)	.09*	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	NS	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	.08*	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS
Management Appeals Ministry Orders (W271/M271)	NS	NS
Workers Appeal Ministry Orders (W272/M272)	NS	NS
INDUSTRIAL RELATIONS CLIMATE		
Labour Relations Climate (MIN#18/WIN#18)	.09*	NS
LEVEL OF DANGER		
Perceived Danger (MIN#20/WIN#20)	-.06	NS
Presence of Designated Substances (MIN#12/WIN#12)	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	NS	NS

*Significant at P = .01 or better.
(U) signifies derived from separate regressions for unionized workplaces only;
(A) MIN#43 = 5 year improvements (reduced danger, etc.)
M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.8 (CON'T)

	Indicators (A)	
	MIN#43	M292
COMMITTEE STRUCTURE		
Committee Coverage (MIN#02)	NS	NS
Centralized Committee Authority (MIN#33/WIN#33)	NS	NS
% Management Members on JHSC (M025A)	NS	NS
COMMITTEE MEMBERS		
Age of Committee (CAGE)	NS	NS
Worker Member Health & Safety Orientations (MIN#08)	NS	.16*
Management Member Scope of Training (MIN#04)	NS	NS
Senior Management on JHSC (M026)	NS	.08*
Mid-Level Management on JHSC (M027)	NS	NS
Safety Directors on JHSC (M028)	NS	NS
% Attendance Management Members (M089A)	NS	NS
Management Members Can Agree to Recommendations on Own (M165)	NS	NS
Worker/Manager Training Combined (M060)	NS	NS
Management Members Average Length of Time on Committee (MAVE)	NS	NS
Management Member Hours/Month on JHSC Business (M090)	NS	NS
RESOURCES		
Satisfaction With Information (MIN#11/WIN#11)	NS	.08*
FORMAL MANDATE AND DECISION-MAKING		
Written Responsibilities for JHSC (M015)	NS	NS
Perceived Influence (MIN#34/WIN#34)	NS	.06
JHSC is a Decision-Making Body (M022/W022)	NS	.06
COMMITTEE ACTIVITIES AND FUNCTIONING		
Institutionalization of Committee Process (MIN#31/WIN#31)	NS	NS
Scope of Committee Activity (WIN#03/MIN#03)	NS	NS
Legal Response to Investigations (WIN#29/MIN#29)	NS	NS
Frequency of Inspections (M101/W101)	NS	.10
Positive Committee Relationships (MIN#37/WIN#37)	.08	.11
Length of JHSC Meetings (M075)	NS	NS
Extra Meetings Called When Needed (W074/M074)	NS	NS
Meeting Attendance (MIN#38/WIN#38)	NS	NS
COMMITTEE PROCESS		
Problem Solving Behaviour (WIN#39/MIN#39)	NS	NS
Negotiating Behaviour (WIN#40/MIN#40)	NS	NS
DISPUTES		
MOL Called to Resolve Assessment Problems (M156)	NS	NS
R	.45	.54
R-Square	.20	.30
Adjusted R-Square	.16	.26

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(A) MIN#43 = 5 year improvements (reduced danger, etc.)

M292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.9
MODEL OF FACTORS INFLUENCING IMPACT OF JOINT HEALTH AND SAFETY COMMITTEES IN DANGEROUS WORKPLACES
(WORKER DATA)

(Coefficients are Beta coefficients (standardized).
Only coefficients significant at P = .05 or better are shown, NS = not significant)

	Indicators (A)	
	WIN#43	W292
FIRM CHARACTERISTICS		
Health & Safety Program (MIN#16/W222)	NS	NS
Language Problems in Workplace (MIN#19/WIN#19)	NS	NS
Size of Workplace	NS	NS
MANAGEMENT CHARACTERISTICS		
Management Health & Safety Orientation (WIN#14/MIN#14)	.13*	NS
Management Approach to Collective Bargaining (WIN#24)		
LABOUR CHARACTERISTICS		
Worker Health & Safety Orientation (WIN#15/MIN#15)	.11*	.13*
Unionized or Not (M246/W246)	NS	NS
Union Health & Safety Resources (WIN#22) (U)	NS	NS
Union Health & Safety Orientation (WIN#23) (U)	NS	.07
Health & Safety Union Labour Relations Overlap (WIN#27) (U)	NS	-.08
Number of Unions (M246a/W246a) (U)	NS	NS
Frequency of Worker Members' Reports to Union (W321) (U)	NS	NS
INDUSTRIAL RELATIONS CLIMATE		
Labour Relations Climate (MIN#18/WIN#18)	.12*	.08*
LEVEL OF DANGER		
Perceived Danger (MIN#20/WIN#20)	NS	NS
Presence of Designated Substances (MIN#12/WIN#12)	NS	NS
Presence of Other Hazards (MIN#13/WIN#13)	NS	NS
COMMITTEE STRUCTURE		
Centralized Committee Authority (MIN#33/WIN#33)	NS	NS
% Worker Members on JHSC (W031A)	NS	NS
COMMITTEE MEMBERS		
WLONE (only one worker committee member)	NS	NS
Age of Committee (CAGE)	NS	NS
Management Member Health & Safety Orientations (WIN#09)	NS	.12*
Worker Member Scope of Training (WIN#05)	NS	NS
Worker Members Can Agree to Recommendations On Own (W166)	NS	NS
Worker Members Average Length of Time on Committee (WAVE)	NS	NS
Worker Member Hours/Month on JHSC Business (W091)	NS	NS

*Significant at P = .01 or better.
(U) signifies derived from separate regressions for unionized workplaces only;
(A) WIN#43 = 5 year improvements (reduced danger, etc.)
W292 = overall assessment of success of JHSC in improving protection of workers.

DISPLAY B.9 (CON'T)

	Indicators (A)	
	WIN#43	W292
RESOURCES		
Satisfaction With Information (MIN#11/WIN#11)	.07	.11*
Scope of Information (WIN#10)	NS	NS
FORMAL MANDATE AND DECISION-MAKING		
Perceived Influence (MIN#34/WIN#34)	NS	NS
JHSC is a Decision-Making Body (M022/W022)	.07*	.07*
COMMITTEE ACTIVITIES AND FUNCTIONING		
Management Control of Chair-Process (WIN#32)	NS	NS
Institutionalization of Committee Process (MIN#31/WIN#31)	NS	.13*
Scope of Committee Activity (WIN#03/MIN#03)	NS	.07
Legal Response to Investigations (WIN#29/MIN#29)	NS	.06
Frequency of Inspections (M101/W101)	.09*	NS
Positive Committee Relationships (MIN#37/WIN#37)	.15*	.12*
# Times Worker Members Meet Non-JHSC Workers (W207)	NS	.08*
Extra Meetings Called When Needed (W074/M074)	NS	NS
Meeting Attendance (MIN#38/WIN#38)	NS	NS
CHARACTERISTICS OF MINISTRY ACTIVITY		
Frequency of Inspection (M264/W264)	NS	NS
Ministry JHSC Linkages (MIN#21A/WIN#21A)	.12*	NS
Ministry Inspector Proactive (MIN#21/WIN#21)	NS	NS
Ministry Issued Orders in Past 12 Months (M267/W267)	NS	NS
Management Appeals Ministry Orders (W271/M271)	NS	NS
Workers Appeal Ministry Orders (W272/M272)	NS	NS
COMMITTEE PROCESS		
Problem Solving Behaviour (WIN#39/MIN#39)	NS	NS
Negotiating Behaviour (WIN#40/MIN#40)	NS	NS
Worker Members Meet Before JHSC (W098)	NS	NS
Workers Suspended/Fired for Work Refusals (W120)	NS	NS
DISPUTES		
Frequency MOL Called to Resolve Work Refusals (W121)	NS	NS
R	.62	.66
R-Square	.38	.43
Adjusted R-Square	.35	.40

*Significant at P = .01 or better.

(U) signifies derived from separate regressions for unionized workplaces only;

(A) WIN#43 = 5 year improvements (reduced danger, etc.)

W292 = overall assessment of success of JHSC in improving protection of workers.

B.3 INDICATORS AND THEIR FORMULATION

B.3.1 Introduction

Indicators used in the analysis take several forms. For example, some indicators take the form of individual items taken from the Ministry of Labour information system.

For example, the Ministry system provides indicators of company size, presence of designated substances and a few other variables. Other items are derived from the screening survey of management which began the survey. That survey, for example provides selected data on age and composition, subcommittee structure of committees.

Most indicators are derived from questions asked in the two main surveys of management members and worker members of JHSC's. These are comprised of two main types:

- o Multi-item indicators (usually of complex phenomena, for example: attitudes, or complexity of the organization's health and safety program).

  These are always formulated as a mathematical sum of the individual standardized item scores
- o Single-item indicators of specific interest, such as "number of meetings per year", and "presence of senior management on committee".

Reliability of indicators is estimated on the basis of internal consistency, for indicators comprised of four or more sub-items. The indicator is ALPHA,* where reasonable reliability is usually suggested by an ALPHA of .7 to .9. (See below for details for specific indicators.)

Reliability cannot be estimated meaningfully for scales with 3 or fewer items except by means of test-retest assessments. Generally assessment of test-retest reliability in the pilot stage of the study, and the overall good reliabilities suggest that these types of measures are acceptably reliable.

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*ALPHA is an estimate of internal consistency of an indicator based on correlations among the items comprising the indicator.

The listings below identify indicators as follows:

- o "WIN#" followed by a two-digit number indicates a multi-item indicator comprised of variables from the worker questionnaire (component variables are listed below each multi-item indicator).
- o "MIN#" followed by a two-digit number indicates a multi-item indicator comprised of variables from the manager questionnaire (component variables are listed below each multi-item indicator).
- o "M" followed by a three-digit number indicates a specific variable in the management member questionnaire. These numbers correspond to the numbers in the right-hand column of each page of the survey questionnaire.
- o "W" followed by a three-digit number indicates a specific variable in the worker member questionnaire.
- o (-) indicates reversal of scoring.
- o (R) indicates recoding or computation of a code.

B.3.2 Indicators for the Worker Member Component of the Study

WIN#03: SCOPE OF COMMITTEE ACTIVITY (ALPHA = .84)
W001 JHSC is responsible for inspecting workplace
W002 JHSC accompanies Ministry inspectors
W003 JHSC reviews Ministry reports
W004 JHSC reviews new processes and substances
W005 JHSC reviews substance control programs
W006 JHSC reviews programs in other firms
W007 JHSC get information regarding the health and safety of similar firms
W008 JHSC gets information on workplace hazards
W009 JHSC investigates work refusals
W010 JHSC investigates accidents
W011 JHSC develops worker training programs
W012 JHSC develops management training programs
W013 JHSC monitors contractors practices

WIN#05: SCOPE OF WORKER MEMBER'S TRAINING (ALPHA = .88)
W051 Worker members get training in health and safety Act
W052 Worker members get accident prevention training
W053 Worker members get hazard recognition training
W054 Worker members get industrial hygiene training
W055 Worker members get designated substances training
W056 Worker members get inspections training
W057 Worker members get problem solving training
(-) W058 Worker members get no training

WIN#07: WORKER MEMBERS AMOUNT OF TRAINING
W038 Number of worker members with 6-16 hours training
W039 Number of worker members with 17-29 hours training
W040 Number of worker members with more than 29 hours training

WIN#09: PERCEIVED MANAGEMENT MEMBERS' ORIENTATION TO HEALTH AND SAFETY (ALPHA = .92)
W061 Management members' knowledge of health and safety Act
W062 Management members' knowledge of safety hazards
W063 Management members' knowledge of health hazards
W064 Management members' contribution to JHSC

WIN#10: SCOPE OF INFORMATION (ALPHA = .80)
(-) W127 Is proprietary health and safety information available
(-) W128 Is information from doctor or nurse available to JHSC
(-) W129 Is workplace information on test-monitoring available to JHSC
(-) W130 Is designated substance information available to JHSC
(-) W131 Is toxic substance information available to JHSC
(-) W132 Is new technology information available to JHSC
(-) W133 Are material safety data sheets available to JHSC
(-) W134 Are yearly accident and health statistics available to JHSC

WIN#11: SATISFACTION WITH INFORMATION
W135 Rating satisfaction of JHSC available information
W136 Rating satisfaction of amount of available information

WIN#12: PRESENCE OF DESIGNATED SUBSTANCES (ALPHA = .76)
W137 Asbestos is present in workplace
W138 Isocyanates is present in workplace
W139 Lead is present in workplace
W140 Mercury is present in workplace
W141 Silica is present in workplace
W142 Vinyl chloride is present in workplace
W143 Benzene is present in workplace
W144 Acrylonitrile is present in workplace
W145 Coke oven emissions are present in workplace

WIN#13: PRESENCE OF OTHER HAZARDS
W157 Noise, heat etc. hazards are present in workplace
W158 Toxic chemicals are present in workplace
W159 Biological agents are present in workplace
(-) W160 None of the above hazards are present in workplace

WIN#14: MANAGEMENT HEALTH AND SAFETY ORIENTATION (ALPHA = .93)
W218 Rating of management's knowledge of health and safety Act
W219 Rating of management's understanding of safety hazards
W220 Rating of management's understanding of health hazards
W221 Rating of management's contribution to JHSC

WIN#15: WORKERS HEALTH & SAFETY ORIENTATION (ALPHA = .90)
W242 Rating workers' knowledge of health and safety Act
W243 Rating workers' understanding of safety hazards
W244 Rating workers' understanding of health hazards
W245 Rating workers' contribution to JHSC

WIN#18: LABOUR-RELATIONS CLIMATE (ALPHA = .95)

W254 Rating of labour/management relations (conflicting to cooperative)
W255 Rating of labour/management (no mutual respect to good mutual respect)
W256 Rating of labour/management (not trusting to trusting)
W257 Rating of labour/management (hostile to friendly)

WIN#19: LANGUAGE PROBLEMS IN HEALTH & SAFETY (ALPHA = .85)

(-) W238 Workers' spoken language is a problem
(-) W239 Managers' spoken language is a problem
(-) W240 Workers' illiteracy is a problem
(-) W241 Managers' illiteracy is a problem

WIN#20: DANGER OF WORKPLACE

W260 Rating danger of accident (not dangerous to very dangerous)
W261 Rating danger of health hazards (not dangerous to very dangerous)
W262 Rating regarding similar firms (less dangerous to more dangerous)

WIN#21: MINISTRY INSPECTOR PROACTIVE (ALPHA = .83)

W274 Ministry inspectors review JHSC minutes
W275 Ministry inspectors provide referrals
W276 Ministry inspectors give improvement advice
W277 Ministry inspectors follow-up on their orders
W278 Ministry inspectors discuss inspection results
W279 Ministry inspectors ask if there are other problems
W280 Ministry inspectors resolve JHSC disputes

WIN#21A: LINKAGE TO MINISTRY (ALPHA = .80)

(-) W266 Number of times worker members go with Ministry on inspections
(-) W268 Are Ministry reports available to JHSC
(-) W269 Are Ministry orders available to JHSC
(-) W270 If JHSC follows-up on Ministry orders

WIN#22: UNION HEALTH & SAFETY RESOURCES (ALPHA = .70)

W322 Union has local or national health and safety committee
W323 Union has full-time health and safety representative paid by employer
W324 Union has full-time health and safety representatives
W325 Union has paid outside health and safety specialists
W326 Union members are knowledgeable regarding health and safety
(-) W327 Union has no resources to aid workers health and safety

WIN#23: UNION HEALTH & SAFETY ORIENTATIONS (ALPHA = .90)

W328 Rating of union leadership regarding general knowledge of health and safety
W329 Rating of union leadership regarding safety hazards
W330 Rating of union leadership regarding health hazards
W331 Rating of union leadership regarding input to JHSC

WIN#24: MANAGEMENT APPROACH TO COLLECTIVE BARGAINING
W315 If management is fair or unfair regarding labour relations
W316 If management is honest or not honest regarding labour relations
W317 If management is weak or strong regarding labour relations

WIN#27: HEALTH & SAFETY UNION/LABOUR RELATIONS OVERLAP
W318 Number of workers that hold positions on local union executive
W319 Number of workers that hold positions on negotiating committee
W320 Number of workers that hold other union positions

WIN#28: LEGAL RESPONSE TO PROCEDURAL REQUIREMENTS
Number of worker members is equal or greater than the number of management members
(R) W032 Worker members are selected by management
(-) W033 Are worker members' names posted for easy access
W069 Number of JHSC meetings in past 12 months
W084 How often does JHSC take written minutes
(-) W092 Are workers paid for JHSC hours

WIN#29: LEGAL RESPONSE TO INVESTIGATIONS
(-) W119 Worker representatives participate in work refusal investigations
(-) W125 When is JHSC informed of critical injuries
(-) W126 Worker members investigate critical injuries

WIN#30: LEGAL RESPONSE TO DESIGNATED SUBSTANCES
(-)W148 An assessment is conducted for each designated substance
(-)W149 Does management consult JHSC in the assessments
(-)W150 All JHSC members get a copy of the assessments

WIN#31: INSTITUTIONALIZED/FORMALIZED PROCESS AND COMMUNICATIONS (ALPHA = .76)
(-) W073 Are meetings regularly scheduled
(-) W033 Are worker members' names posted for easy access
W084 How often does JHSC take written minutes
W083 How often does JHSC have written agenda
W085 How often does JHSC propose actions with recommendations
W086 How often does JHSC set recommendation implementation dates
(R) W087 Are minutes approved formally
(-) W107 Is the inspection guided by procedure or plan
(R) W108 Worker members provide report after inspections
W109 Worker members get inspection reports
W110 Management members get inspection reports
W111 Other workers get inspection reports
W112 Other managers get inspection reports
W113 Union gets inspection reports
(-) W116 Inspections follow-up previous problems
W208 JHSC minutes are posted in workplace
W209 JHSC minutes are distributed to workers
W210 JHSC minutes are distributed to management
(-) W211 JHSC minutes are not posted or distributed.

WIN#32: MANAGEMENT CONTROL OF CHAIR/PROCESS
(R) W087A management member approves final minutes
(R) W077 The chairman is selected by management
(R) W078 The chairman is always from management

WIN#33: CENTRALIZED COMMITTEE POWER (ALPHA = .69)

(-) W070 Chairman or co-chairman calls JHSC meetings
(R) W076 Is there a chairman or co-chairman
(-) W080 Chairman or co-chairman decides meeting agenda
W071 Any management member can call JHSC meeting
W072 Any worker member can call JHSC meeting
W081 Any management member can suggest meeting items
W082 Any worker member can suggest meeting items

WIN#34: PERCEIVED WORKER INFLUENCE IN THE JHSC

W099 Rating of management and worker member general influence
W100 Rating of management and worker member procedure influence

WIN#35: ACTIONS ON DESIGNATED SUBSTANCES (ALPHA = .86)

(-) W148 An assessment is conducted for each designated substance
(-) W149 Does management consult JHSC in the assessments
(-) W150 All JHSC members get a copy of the assessments
(-) W151 Did JHSC make recommendations regarding the assessment
(-) W152 Are control progams placed regarding designated substances
(-) W153 Was JHSC consulted regarding the control program
(-) W154 Did JHSC make recommendations regarding the program
(-) W155 Does JHSC get test-monitoring results

WIN#36: ACTIONS ON OTHER HAZARDS

W161 JHSC assesses the nature of hazardous substances
W162 JHSC recommends control programs for hazardous substances
W163 JHSC gets results of hazards substances tests
(-) W164 JHSC does none of the above

WIN#36A: SCOPE OF INSPECTION GROUP (ALPHA = .51)

W102 Management members do inspections with worker members
W103 Union staff inspects with worker members
W104 Other workers inspect with worker members
W105 Other management inspects with worker members
(-) W106 No other people inspect with worker members

WIN#37: POSITIVE COMMITTEE RELATIONSHIPS (ALPHA = .94)

W179 Rating management/worker relationship (conflicting to co-operative)
W180 Rating management/worker relationship (no mutual respect to good mutual respect)
W181 Rating management/worker relationship (not trusting to trusting)
W182 Rating management/worker relationship (hostile to friendly)

WIN#38: MEETING ATTENDANCE

W093 Meeting non-attendance is due to schedule conflict
W094 Meeting non-attendance is due to other conflict
W096 Meeting non-attendance is due to illness or absence
(-) W097 All members attend regularly

WIN#39: PROBLEM SOLVING (ALPHA = .81)

W184 Management members propose forming sub-committee
W185 Management members propose getting outside advice
W186 Management members propose other employee advice
W187 Management members found out other firms' methods
W188 Management members provide needed information
W189 Management members propose new solutions

WIN#40: NEGOTIATIONS (ALPHA = .72)
W196 Management members denied there was a problem
W197 Management members refuse to discuss a problem
W198 Management members threaten (withdraw prevention agreement)
W199 Management members say issue threatened layoffs
W200 Management members said would take issue to Ministry

WIN#41: STRENGTH/SUCCESS OF COMMITTEE RECOMMENDATIONS
W168 Percentage of JHSC recommendations now accepted
W169 Percentage of JHSC recommendations that need money
W170 Percentage of spending recommendations implemented

WIN#42: MANAGEMENT REJECTION OF RECOMMENDATIONS (ALPHA = .65)
W173 Management rejects recommendations due to cost
W175 Management rejects recomendations because they think there is no need
W176 Management rejects recommendations because they need plans
(-) W178 Management does not reject recommendations

WIN#43: PERCEIVED 5 YEAR IMPROVEMENT IN DANGER/HAZARDS
W286 Compare present danger of accident to 5 years ago
W287 Compare present danger of health hazards to 5 years ago
W288 Compare management and worker understanding health and safety to 5 years ago

WIN#44: PERCEIVED 12 MONTHS IMPROVEMENT IN DANGER/HAZARDS
W289 Compare present danger of accident to 12 months ago
W290 Compare present danger of health hazards to 12 months ago
W291 Compare management and worker understanding of health and safety to 12 months ago

WIN#45: PERCEIVED JHSC SUCCESS/IMPACT (ALPHA = .91)
W281 Rating of JHSC impact in reducing accidents
W282 Rating of JHSC record reducing potential hazards
W283 Rating of JHSC ability to obtain changes
W284 Rating of JHSC ability to educate workers
W285 Rating of JHSC ability to educate management

WIN#46: PERCEIVED NEED FOR IMPROVEMENTS (ALPHA = .92)
W293 More management representation would improve JHSC
W294 More worker representation would improve JHSC
W295 More worker support would improve JHSC
W296 More management support would improve JHSC
W297 More frequent meetings would improve JHSC
W298 Better procedures would improve JHSC
W299 More safety training would improve JHSC
W300 More health training would improve JHSC
W301 More technical information study time would improve JHSC
W302 Better inspection procedures would improve JHSC
W303 Better health and safety in-house staff would improve JHSC

W304 Better outside advice would improve JHSC
W305 More health and safety information would improve JHSC
W306 More JHSC authority would improve JHSC
W307 More management money support would improve JHSC
W308 Strong Ministry legislation enforcement would improve JHSC
W309 More Ministry advice and/or help would improve JHSC
W310 Better labour/management relations would improve JHSC
W311 Better management/worker member relationships would improve JHSC

OTHER WORKER ITEMS (SINGLE QUESTIONS)

W022 Is JHSC regarded as decision making body
W031 Number of worker members on JHSC
W074 Are more meetings called when needed
W088 Number of worker members attending meetings
W091 Hours per month workers spend on JHSC work
W098 How often worker members meet before the JHSC meets
W101 Frequency of workplace inspections
W115 No inspection reports are provided
W117 Rating of success of inspections
W118 Number of health and safety work refusals in past 12 months
W120 Any workers suspended or fired for work refusals
W121 The Ministry is called frequently to resolve work refusals
W122 Any critical injuries in past 12 months
W123 Number of fatalities in past 12 months
W124 Number of critical injuries in past 12 months
W147 Not known what is present in workplace
W166 Can worker members agree to recommendations on own
W171 Frequency of important health issues resolved
W172 Frequency of important safety issues resolved
W183 How have management/worker relations changed in past 12 months
W207 Number of times worker members meet non-JHSC workers
W222 Does employer have health and safety policy or program
W235 Rating of management program efforts
W246 Whether a union is in the workplace
W246a Number of unions in the workplace
W258 Effect of JHSC on management/labour relations
W259 Rating of how management/labour relationships have changed
W264 Frequency of Ministry inspections of the workplace
W267 If Ministry orders were issued in the past 12 months
W271 Management appeals Ministry orders
W272 Workers or union appeal Ministry orders
W273 Neither management nor workers appeals Ministry orders
W292 Whether the JHSC is working or not to improve worker safety
W321 Frequency of worker members' reporting to union officers

B.3.3 Indicators of the Management Member Component of the Study

MIN#01: WORKPLACE COMPLEXITY/SIZE (ALPHA = .67)
(-)M016 Does JHSC serve more than 1 building
(-)M018 Does JHSC serve more than 1 department
(-)M020 Does JHSC serve more than 1 location

MIN#02: COMMITTEE COVERAGE (ALPHA = .82)
(-)M017 Do all buildings have JHSC representatives
(-)M019 Do all departments have JHSC representatives
(-)M021 Do all locations have JHSC representatives

MIN#03: SCOPE OF COMMITTEE ACTIVITY (ALPHA = .82)
M001 JHSC is responsible for inspecting the workplace
M002 JHSC accompanies Ministry inspectors
M003 JHSC reviews Ministry reports
M004 JHSC reviews new processes or substances
M005 JHSC reviews substance control programs
M006 JHSC reviews programs in other firms
M007 JHSC get information regarding health and safety in similar firms
M008 JHSC gets information on workplace hazards
M009 JHSC investigates work refusals
M010 JHSC investigates accidents
M011 JHSC develops worker training programs
M012 JHSC develops management training programs
M013 JHSC monitors contractors practices

MIN#04: SCOPE OF MANAGEMENT MEMBERS' TRAINING (ALPHA = .82)
M042 Management members get training in health and safety Act
M043 Management members get accident prevention training
M044 Management members get hazard recognition training
M045 Management members get industrial hygiene training
M046 Management members trained on designated substances
M047 Management members get inspections training
M048 Management members get problem solving training
(-)M049 Management members get no training

MIN#06: MANAGER MEMBERS' AMOUNT OF TRAINING
M034 Number of management members with 6-16 hours training
M035 Number of management members with 17-29 hours training
M036 Number of management members with more than 29 hours training

MIN#08: PERCEIVED WORKER MEMBER ORIENTATION TO HEALTH & SAFETY (ALPHA = .85)
M065 Worker members' knowledge of health and safety Act
M066 Worker members' knowledge of safety hazards
M067 Worker members' knowledge of health hazards
M068 Worker members' contribution to JHSC

MIN#11: SATISFACTION WITH INFORMATION (ALPHA = .95)
M135 Rating of satisfaction with information available to JHSC
M136 Rating of satisfaction with the amount of information available to JHSC

MIN#12: PRESENCE OF DESIGNATED SUBSTANCES (ALPHA = .76)

M137 Asbestos is present in workplace
M138 Isocyanates is present in workplace
M139 Lead is present in workplace
M140 Mercury is present in workplace
M141 Silica is present in workplace
M142 Vinyl Chloride is present in workplace
M143 Benzene is present in workplace
M144 Acrylonitrile is present in workplace
M145 Coke oven emissions are present in workplace

MIN#13: PRESENCE OF OTHER HAZARDS (ALPHA = .31)

M157 Noise, heat etc. hazards are present in workplace
M158 Toxic chemicals are present in workplace
M159 Biological agents are present in workplace
(-) M160 None of above hazards are present in workplace

MIN#14: MANAGEMENT HEALTH & SAFETY ORIENTATION (ALPHA = .91)

M218 Rating of management knowledge of health and safety Act
M219 Rating of management understanding of safety hazards
M220 Rating of of management understanding of health hazards
M221 Rating of management contribution to JHSC

MIN#15: WORKERS' HEALTH & SAFETY ORIENTATION (ALPHA = .89)

M242 Rating of workers' knowledge of health and safety Act
M243 Rating of workers' understanding of safety hazards
M244 Rating of workers' understanding of health hazards
M245 Rating of workers' contribution to JHSC

MIN#16: HEALTH AND SAFETY PROGRAM (ALPHA = .89)

M223 Program includes health and safety staff
M224 Program includes formal training
M225 Program includes employee input system
M226 Program includes workplace inspections
M227 Program includes written safety rules
M228 Program includes investigation of accidents
M229 Program includes information on toxic substances and hazards
M230 Program includes management health and safety performance appraisals
M231 Program includes emergency procedures

MIN#17: ORGANIZATION ECONOMIC STRENGTH/LEVELS OF ACTIVITY (ALPHA = .81)

M214 Rating operating capacity (partial capacity to full capacity)
M215 Rating operations (reducing operations to expanding operations)
M216 Rating employment (laying off to hiring)

MIN#18: LABOUR RELATIONS CLIMATE (ALPHA = .96)

M254 Rating labour/management relations (conflicting to cooperative)
M255 Rating labour/management (no mutual respect to good mutual respect)
M256 Rating labour/management (not trusting to trusting)
M257 Rating labour/management (hostile to friendly)

MIN#19: LANGUAGE PROBLEMS IN H & S (ALPHA = .85)

(-) M238 Workers' spoken language is a problem
(-) M239 Managers' spoken language is a problem
(-) M240 Workers' illiteracy is a problem
(-) M241 Managers' illiteracy is a problem

MIN#20: DANGER OF WORKPLACE (ALPHA = .78)

M260 Rating danger of accident (not dangerous to very dangerous)
M261 Rating danger of health hazards (not dangerous to very dangerous)
M262 Rating regarding similar firms (less dangerous to more dangerous)
M263 Rating regarding other firms (less dangerous to more dangerous)

MIN#21: MINISTRY INSPECTOR PROACTIVE (ALPHA = .77)

M274 Ministry inspectors review JHSC minutes
M275 Ministry inspectors provide referrals
M276 Ministry inspectors give improvement advice
M277 Ministry inspectors follow-up orders
M278 Ministry inspectors discuss inspection results
M279 Ministry inspectors ask if other problems
M280 Ministry inspectors resolve JHSC disputes

MIN#21A: LINKAGE TO MINISTRY (ALPHA = .61)

M265 Management members do inspections with Ministry
M268 Are Ministry reports available to JHSC
M269 Are Ministry orders available to JHSC

MIN#25: PERCEPTION OF UNION APPROACH TO COLLECTIVE BARGAINING (ALPHA = .83)

M247 Rating unions' collective bargaining (unfair to fair)
M248 Rating unions' collective bargaining (dishonest to honest)
M249 Rating unions' collective bargaining (weak to strong)

MIN#26: HEALTH & SAFETY MANAGEMENT/LABOUR RELATIONS OVERLAP (ALPHA = .61)

(-) M251 Number of union grievances in past 12 months
(-) M252 How often collective agreement is used on matters
(-) M253 How often health and safety is a topic for collective bargaining

MIN#29: LEGAL RESPONSE TO INVESTIGATIONS

(-) M119 Worker representatives participate in work refusal investigations
(-) M125 When is JHSC informed of critical injuries
(-) M126 Worker members investigate critical injuries

MIN#30: LEGAL RESPONSE TO DESIGNATED SUBSTANCES
(ALPHA = .38)
(-) M148 An assessment is conducted for each designated substance
(-) M149 Does management consult JHSC in assessments
(-) M150 All JHSC members get a copy of assessments

MIN#31: INSTITUTIONALIZATION/FORMAL PROCESS/
COMMUNICATIONS (ALPHA = .70)
(-) M073 Are meetings regularly scheduled
M109 Worker members get inspection reports
M110 Management members get inspection reports
M111 Other workers get inspection reports
M112 Other managers get inspection reports
M113 Union gets inspection reports
(-) M206 Frequency of management reports to non-JHSC management
M208 JHSC minutes are posted in workplace
M209 JHSC minutes are distributed to workers
M210 JHSC minutes are distributed to management
(-) M211 JHSC minutes not posted or distributed

MIN#33: CENTRALIZED COMMITTEE POWER
(-) M070 Chairman or co-chairman calls JHSC meeting
M071 Any management member can call JHSC meeting
M072 Any worker member can call JHSC meeting
(-) M080 Chairman or co-chairman decides meeting agenda
M081 Any management member can suggest meeting items
M082 Any worker member can suggest meeting items

MIN#34: PERCEIVED WORKER INFLUENCE IN THE JHSC
M099 Rating of worker and management member general influence
M100 Rating of worker and management member procedure influence

MIN#35: ACTIONS ON DESIGNATED SUBSTANCES
(-) M148 An assessment is conducted for each designated substance
(-) M149 Did management consult JHSC in assessment
(-) M150 All JHSC members get a copy of assessment
(-) M151 Did JHSC make recommendations regarding assessments
(-) M152 Are control programs placed regarding designated substances
(-) M153 Was JHSC consulted regarding control programs
(-) M154 Did JHSC make recommendations regarding programs
(-) M155 Does JHSC get test-monitoring results

MIN#36: ACTIONS ON OTHER HAZARDS (ALPHA = .61)
M161 JHSC assesses nature of hazardous substances
M162 JHSC recommends control programs for hazardous substances
M163 JHSC gets results of hazards substance tests
(-) M164 JHSC does none of the above

MIN#37: POSITIVE COMMITTEE RELATIONSHIPS (ALPHA = .89)
M179 Rating management/worker relationship (conflicting to co-operative)
M180 Rating management/worker relationship (no mutual respect to good mutual respect)
M181 Rating management/worker relationship (not trustign to trusting)
M182 Rating management/worker relationship (hostile to friendly)

MIN#38: MEETING ATTENDANCE
M093 Meeting non-attendance is due to schedule conflict
M094 Meeting non-attendance is due to other conflict
M096 Meeting non-attendance is due to illness or absence
(-) M097 All members attend regularly

MIN#39: PROBLEM SOLVING (ALPHA = .80)
M190 Worker members propose forming sub-committee
M191 Worker members propose getting outside advice
M192 Worker members propose other employee advice
M193 Worker members found out others methods
M194 Worker members provide needed information
M195 Worker members propose new solutions

MIN#40: NEGOTIATIONS (ALPHA = .73)
M201 Worker members threat (withdraw prevention agreement)
M202 Worker members threat (use collective bargaining)
M203 Worker members threat (present grievances)
M204 Worker members threat (take issue to Ministry)
M205 Worker members threat (go to press or media)

MIN#41: COMMITTEE RECOMMENDATIONS (ALPHA = .96)
M168 Percentage of JHSC recommendations implemented by management
M169 Percentage of JHSC recommendations that involve spending
M170 Percentage of spending recommendations implemented

MIN#42: MANAGEMENT REJECTION OF RECOMMENDATIONS
M173 Management rejects recommendations because of cost
M175 Management rejects recommendations because they think there is no need
M176 Management rejects recommendations because they need plans
(-) M178 Management does not reject recommendations

MIN#43: PERCEIVED 5 YEAR IMPROVEMENT IN DANGER/HAZARDS (ALPHA = .85)
M286 Compare present danger of accident to 5 years ago
M287 Compare present danger of health hazards to 5 years ago
M288 Compare present management/worker understanding health and safety to 5 years ago

MIN#44: PERCEIVED 12 MONTH IMPROVEMENT IN DANGER/HAZARDS (ALPHA = .88)
M289 Compare present danger of accident to past 12 months
M290 Compare present danger of health hazards past 12 months
M291 Compare present management/worker understanding health and safety to past 12 months

MIN#45: PERCEIVED JHSC SUCCESS/IMPACT (ALPHA = .89)

M281 Rating of JHSC impact in reducing accidents
M282 Rating of JHSC record reducing potential hazards
M283 Rating of JHSC ability to obtain changes
M284 Rating of JHSC ability to educate workers
M285 Rating of JHSC ability to educate managers

MIN#46: NEED FOR IMPROVEMENTS (ALPHA = .89)

M293 More management representatives would improve JHSC
M294 More worker representatives would improve JHSC
M295 More worker support would improve JHSC
M296 More management support would improve JHSC
M297 More frequent meetings would improve JHSC
M298 Better procedures would improve JHSC
M299 More safety training would improve JHSC
M300 More health training would improve JHSC
M301 More technical information study time improve JHSC
M302 Better inspection procedures would improve JHSC
M303 Better health and safety in-house staff would improve JHSC
M304 Better outside advice would improve JHSC
M305 More health and safety information would improve JHSC
M306 More JHSC authority would improve JHSC
M307 More management money support would imp. JHSC
M308 Strong Ministry legislation enforcement would improve JHSC
M309 More Ministry advice and/or help would improve JHSC
M310 Better labour/management relations would improve JHSC
M311 Better management/worker member relationships would improve JHSC

OTHER MANAGEMENT ITEMS (SINGLE QUESTIONS)

M015 Did JHSC write down responsibilities
M022 Is JHSC regarded as decision making body
M025 Number of management members on JHSC
M026 Senior management are on JHSC
M027 Mid-level management are on JHSC
M028 Safety directors are on JHSC
M029 Doctors-nurses are on JHSC
M030 Industrial relations specialists are on JHSC
M060 Is management/worker member training combined
M074 Are more meetings called when needed
M075 Length of average JHSC meeting
M089 Number of management members attending meetings
M090 Hours per month management members spend on JHSC work
M101 Frequency of workplace inspections
M115 No inspection reports are provided
M117 Rating of success of inspections
M118 Number of health and safety work refusals in past 12 months
M121 Frequency of Ministry calls that resolve work refusals
M122 Any critical injuries in past 12 months
M123 Number of fatalities in past 12 months
M124 Number of critical injuries in past 12 months

M147 Do not know what is present in workplace
M156 Is Ministry called to resolve assessment problems
M165 Can management agree to recommendations on its own
M171 Number of important health issues JHSC resolved
M172 Number of important safety issues JHSC resolved
M206 Frequency management reports to non-JHSC management
M212 Type of company or organization
M213 Whether workplace is national or international
M217 Rating operations (unprofitable or profitable)
M222 Whether employer has health and safety policy or program
M233 Whether health and safety program or policy is written
M234 Is written program available to all workers
M235 Rating management program efforts (poor to excellent)
M236 High or low worker turnover past 12 months
M237 Rating worker experience level (low experience to high experience)
M246 Whether there is a union in workplace
M246a Number of unions in workplace
M258 Effect of JHSC on management/labour relations
M259 Rating how management/labour relations have changed
M264 Frequency of Ministry inspection of workplace
M267 Were Ministry orders issued in past 12 months
M271 Management appeals Ministry orders
M272 Workers or union appeal Ministry orders
M273 Neither management nor workers appeal Ministry orders
M292 How JHSC working to improve worker safety

APPENDIX C:

STUDY QUESTIONNAIRES AND DESCRIPTIVE STATISTICS

The appendices to follow contain "mock-ups" of the study questionnaires:

C.1: The Screening Survey Questionnaire:
shows statistical data only for quantifiable questions; portions relating to names; addresses etc. of committee members show no additional information.

C.2: Questionnaire for Management Members of JHSCs.

C.3: Questionnaire for Worker Members of JHSCs.

These show the study questionnaires, with certain artwork (boxes for checking off etc.) removed, and descriptive statistics inserted instead.

Descriptive statistics shown are usually percentages giving selected responses, or means. These statistics are all weighted to represent the JHSCs for the population of Ontario workplaces covered by the Act, and correspond to statistics presented in the report.

In a few cases, a mean is provided for semantic differential type rating scales. These are always indicated by opposite adjective pairs such as "poor" opposite "excellent", or "worse now" opposite "better now". These means are always for a seven point rating scale, where "1" is associated with the first adjective, and "7" is associated with the second adjective. An asterisk (*) in a series of percentages is usually for a category that has been excluded from the computations, for example, the "don't know" category is excluded from most computations of descriptives. More details on descriptive statistics are available from the Advisory Council on request.

For the two committee members' questionnaires, variables used in the survey are identified by a variable number located in the right margin (sometimes a series of variable numbers is implied, e.g. the first of a series of items has a variable number typed in as does the last in the series).

ONTARIO SURVEY OF JOINT HEALTH AND SAFETY COMMITTEES

Ontario Advisory Council on Occupational Health and Occupational Safety

Regarding the joint health and safety committee for:

Instructions: Complete each question by checking the appropriate box, or by typing or writing in (PLEASE PRINT) the information requested. The information provided will be used to identify the committee members who will receive the survey questionnaire, and for any other follow-up contacts which are required. All information is strictly confidential. (BE SURE TO ANSWER EVERY QUESTION)

Definition: By workplace, we mean the specific work site(s) or operation(s) described on the above label.

Please complete and return in the postage-paid envelope as soon as possible.

PART ONE: INTRODUCTION

1. Is a joint health and safety committee with at least 1 worker and 1 management member currently operating in this workplace? (CHECK ONE BOX AND PROVIDE ANY ADDITIONAL INFORMATION INDICATED)

93.1% Yes, there is a committee with at least 1 worker member and 1 management member, and it has met ____ times in the past 12 months. (COMPLETE THE ENTIRE QUESTIONNAIRE AND RETURN) mean of 8.6 meetings

1.9 Yes, there is a committee, but it has not met in the past 12 months.

1.1 Yes, there is a committee, but it does not have at least 1 worker and 1 management member at this time.

3.7 There is no committee.

GO TO Q.15, LAST PAGE

.3 Other (PLEASE EXPLAIN) ________________________________

If, in your opinion, a similar committee is in operation, please describe here and complete all four pages of this form. If a similar committee is not in operation, complete Questions 15 to 20 on the last page.

Please note that if there is more than one health and safety committee in this workplace, the questions to follow apply to the steering or coordinating committee.

If two or more separate joint health and safety committees exist in this workplace, and these are not subcommittees for another committee, please provide the following information for each of these independent committees. Detailed information on subcommittees need not be provided, except as noted. Telephone the survey office if more forms are needed, at (416) 465-5390.

PART TWO: MANAGEMENT MEMBERS OF THE COMMITTEE

2. How many management members sit on the committee? mean = 2.6

3. If there is a management committee member who is chairman or co-chairman, please provide the information indicated below) (PLEASE TYPE OR PRINT)

   Name: ______

   Position in organization: ______

   Mailing address if different from the label on the front of the form:

   ______

   Telephone number(s) Work: ______ Home: ______

   Indicate preferred contact number: Work Home

   Length of time on committee: _____ Years _____ Months

4. If no management member is chairman or co-chairman, as noted in Question 3, please provide the name and address information for the management member who has been a member of the committee longest. (PLEASE TYPE OR PRINT)

   Name: ______

   Position in organization: ______

   Mailing address if different from the label on the front of the form:

   ______

   Telephone number(s) Work: ______ Home: ______

   Indicate preferred contact number: Work Home

   Length of time on committee: _____ Years _____ Months

5. Please provide below or attach a list of names of any other management members of the committee, indicating number of years on the committee for each, and position, including any members who are health and safety staff. (PLEASE TYPE OR PRINT)

mean years on committee = 3.63

PART THREE: WORKER MEMBERS OF THE COMMITTEE

6. How many worker members sit on the committee? mean = 3.78

7. If there is a worker committee member who is chairman or co-chairman, please provide the information indicated below) (PLEASE TYPE OR PRINT)

Name: ______________________________

Position in organization: ______________________________

Mailing address if different from the label on the front of the form:

____

Telephone number(s) Work: __________ Home: __________

Indicate preferred contact number: Work Home

Length of time on committee: _____ Years _____ Months

8. If no worker member is chairman or co-chairman, as noted in Question 7, please provide the name and address information for the worker member who has been a member of the committee longest. (PLEASE TYPE OR PRINT)

Name: ______________________________

Position in organization: ______________________________

Mailing address if different from the label on the front of the form:

____

Telephone number(s) Work: __________ Home: __________

Indicate preferred contact number: Work Home

Length of time on committee: _____ Years _____ Months

9. Please provide below or attach a list of names of any other worker members of the committee, indicating number of years on the committee for each, and position, including any members who are health and safety staff. (PLEASE TYPE OR PRINT)

mean = 2.74 years on committee

PART FOUR: INFORMATION ABOUT THE COMMITTEE

10. In what year was the committee established? mean = 1978.9

11. If established before 1979, was the committee established voluntarily by management, or by collective bargaining? (CHECK ONE)
88.5% Voluntarily
11.5 Through collective bargaining

12. Does the committee have a subcommittee structure? (CHECK ONE)
7.6% Yes
92.4 No (GO TO Q.14)

13. IF YES to Question 12, please indicate how many subcommittees: mean = 5.53, and indicate on an attached sheet, the names of each of these subcommittees, and the number of management and worker members on each.

14. Does the committee represent or act for any workplaces or locations other than those specifically named on the front of this questionnaire? (CHECK ONE)
14.0% Yes (SPECIFY HOW MANY OTHERS) mean = 7.78
86.0 No

PART FIVE: SOME INFORMATION ABOUT THE WORKPLACE

15. In what year was the workplace named on the front of this form first established? (CHECK ONE)
44.1% 1960 or earlier
55.9 1961 or later (SPECIFY YEAR) mean = 1972.6

16. How many employees are there in total in this workplace? mean = 360

(a) How many of these are management and office staff? mean = 61

17. Does the size of the workforce vary seasonally? (CHECK ONE)
9.2% Yes, considerably
36.8 Yes, somewhat
54.0 No

18. Are any of the employees represented by a union or an employee association? (CHECK ONE)
60.1% Yes, one or more unions (SPECIFY NUMBER) mean = 1.45
4.4 Yes, an employee association
35.5 No

19. If there is a union, what percentage of employees would you estimate are represented by the union(s)? mean = 78.8%

20. PLEASE INDICATE BELOW THE NAME AND TELEPHONE NUMBER OF THE PERSON COMPLETING THIS FORM.

Name: ______________________ Position: ____________________

Telephone number(s) Work: ______________ Home: ____________________

______________________________ ____________________
Signature of person completing this form Date

PLEASE RETURN IMMEDIATELY. THANK YOU FOR YOUR COOPERATION.

SURVEY OF JOINT HEALTH AND SAFETY COMMITTEES IN ONTARIO

A Study by the Ontario Advisory Council on Occupational Health and Occupational Safety

QUESTIONNAIRE FOR MANAGEMENT MEMBERS OF THE JOINT HEALTH AND SAFETY COMMITTEE FOR:

INSTRUCTIONS

HOW TO COMPLETE THE QUESTIONNAIRE

Please read the instructions before beginning. Note that most questions appear on the left side of the page, with the answers appearing on the right side of the page. Some answers are placed below the questions and are pointed to by arrows.

For most questions: Simply indicate your answer by checking the box next to the answer which is best for your committee (most accurate, or best estimate of management members' views), or write in the answer which is correct for you.

For special 1 to 7 rating scales:

Some questions ask you to indicate your answer on a 7 point scale, for example:

Q. Are health and safety issues simple or complicated?

SIMPLE 1 2 3 4 5 6 7 COMPLICATED

To answer such a question, you would circle the

"1" if you thought the best answer was "very simple",

"2" or "3" would indicate that the answer was fairly simple, but not "very simple",

"4" if you thought the best answer was "in between", or if you weren't sure,

"5" or "6" would indicate that the answer was "fairly complicated",

"7" if you thought the best answer was "very complicated".

(INSTRUCTIONS CONTINUE ON THE BACK OF THIS PAGE)

ESTIMATES ARE SATISFACTORY: For questions like "how many meetings has the committee had in the past 12 months?", provide your best estimate, do not bother to check minutes or records.

IF NONE OF THE ANSWERS ARE QUITE RIGHT FOR YOUR COMMITTEE: In some cases, the answers we have provided will not explain what you want to tell us. In those cases, check or circle the "best" answer we have provided, and then write in any extra comments you have.

SKIP INSTRUCTIONS: Some of the answers you check or circle are followed by instructions to "go to" a question number or section further on in the questionnaire. This means you should "skip" a set of questions which will not apply to your committee. Please follow these carefully, and only skip where the specific answer you check is followed by a skip instruction.

DEFINITIONS:

JHSC: Always refers to the joint health and safety committee for the workplace which is printed on the label on the front page of the questionnaire. This means the whole joint health and safety committee, including both worker and management members together.

Worker Members: Always refers to the members of the JHSC who are workers (not management, not supervisory staff), and who represent the worker "side" of the JHSC.

Management Members: Always refers to the members of the JHSC, who are management (senior or middle management, or supervisory staff), and who represent the management "side" of the JHSC.

The Workplace: The name of the workplace is printed on the label on the front page of the questionnaire.

You/your: Always refers to the management members of your JHSC.

Ministry: Always refers to the Ontario Ministry of Labour.

ALL INFORMATION IS STRICTLY CONFIDENTIAL

The Council has taken extensive steps to assure confidentiality of your answers, even from the Ministry of Labour.

To assure confidentiality within the workplace, Management members completing the questionnaire should not ask to see the worker member(s)' questionnaire or answers, and worker members have been requested not to ask to see the management member(s)' completed questionnaire.

PLEASE FILL OUT THE QUESTIONNAIRE AND MAIL IT BACK AS SOON AS POSSIBLE.

THANK YOU VERY MUCH FOR YOUR ASSISTANCE WITH THIS STUDY.

A. JOINT HEALTH AND SAFETY COMMITTEE (JHSC) RESPONSIBILITIES AND STRUCTURE

A.01. Which of the following are regarded by your Joint Health and Safety Committee (JHSC) as its duties or responsibilities? (CHECK ALL THAT APPLY)

% Indicating 'Yes'		Office Use
		1*
95.4	Inspect workplace	
88.9	Accompany Ministry inspectors	
85.9	Review Ministry inspection reports	
39.1	Review new technology/processes/substances before they are used in the workplace	
47.8	Review assessment and control programs for designated substances	
80.3	Review company health and safety programs/policies	
42.7	Get information on health and safety practices in similar workplaces	
74.6	Get information on existing workplace hazards	
62.4	Investigate work refusals	
83.1	Investigate accidents	
45.4	Develop educational/training programs for workers	
31.0	Develop educational/training programs for management	
32.8	Monitor health and safety practices of outside contractors in the workplace	
.5	NONE OF THE ABOVE	14

A.02. Has your JHSC adopted a written statement of its objectives, responsibilities and duties?	46.2%	Yes	15
	53.8	No	
A.03. Does the JHSC serve more than one major building or area?	37.8%	Yes	16
	62.2	No → (GO TO A.04)	
(a) (IF YES) Are there JHSC members representing all major buildings or areas?	87.7%	All are represented	
	10.4	Most are represented	17
	1.9	Only a few are represented	
A.04. Does the JHSC serve more than one major department or division?	61.6%	Yes	18
	38.4	No → (GO TO A.05)	
(a) (IF YES) Are there JHSC members representing all major departments or divisons?	78.0%	All are represented	
	17.9	Most are represented	19
	4.0	Only a few are represented	
A.05. Does the JHSC serve more than one physically separate location?	30.3%	Yes	20
	69.7	No → (GO TO A.06)	
(a) (IF YES) Are there JHSC members representing all separate locations?	91.0%	All are represented	
	6.9	Most are represented	21
	2.2	Only a few are represented	

	% Indicating 'Yes'		
A.06. Overall, is your JHSC regarded by your members as: (CHECK ALL THAT APPLY)	41.1%	A decison-making body	22*
	72.2	An advisory body	
	56.9	An information sharing body	24

B. JHSC (JOINT HEALTH AND SAFETY COMMITTEE) MEMBERS

B.01. How many MANAGEMENT members are on your JHSC? ____ mean = 2.99 25

B.02. What types of management staff are on your JHSC at this time? (CHECK ALL THAT APPLY)

% 'Yes'		
50.3	The senior manager/other senior managers	26*
73.7	Middle level managers/supervisors	
27.7	Safety Director	
15.4	Doctor, nurse	
17.7	Industrial relations specialists or personnel manager	30

C. EXPERIENCE, TRAINING, AND ATTITUDES OF JHSC MEMBERS

C.01. How many management members of your JHSC have had the following amounts of health and safety training under any program? (WRITE IN THE NUMBER OF MANAGEMENT MEMBERS NEXT TO EACH CATEGORY, PROVIDE BEST ESTIMATE)

mean		
1.33	A 1 to 2 day seminar/course (6 to 16 hours)	34
.36	A course of 3 - 4 days (17 to 29 hours)	35
.37	A course of more than 4 days (over 29 hours)	36
% 'Yes'		
21.5	MANAGEMENT MEMBERS HAVE HAD NO SUCH TRAINING	37

C.02. What types of formal training have been provided to management JHSC members? (CHECK ALL THAT APPLY)

% 'Yes'		
59.5	Training on Occupational Health & Safety Act	42*
58.1	Accident prevention, causation and investigation	
48.5	Hazard recognition	
21.2	Industrial hygiene	
22.5	Assessment and control programs for designated substances	
44.0	Inspections	
26.7	Problem solving techniques	
19.4	MANAGEMENT MEMBERS HAVE HAD NO SUCH TRAINING	49

C.03. Is training for management and worker JHSC members combined or separate? (CHECK ONE)

25.6%	Mostly separate	
27.8	Some combined, some not	60
24.6	Mostly combined	
22.0	No training is provided	

C.04. Please assess worker members of your JHSC as to: (CIRCLE ONE ANSWER FOR EACH OF (a) TO (d))

		ADEQUATE		
(a) general knowledge of Occupational Health and Safety Act and regulations	POOR	mean = 4.13	EXCELLENT	65
(b) understanding of and concern for safety hazards in this type of workplace	POOR	mean = 5.15	EXCELLENT	66
(c) understanding of and concern for health hazards in this type of workplace	POOR	mean = 4.96	EXCELLENT	67
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)	POOR	mean = 5.15	EXCELLENT	68

D. JHSC MEETINGS IN THE PAST 12 MONTHS

	% 'Yes'		
D.01. Who can call JHSC meetings? (CHECK ALL THAT APPLY)	53.8	Chairman or co-chairmen only	70*
	56.8	Any management members	
	55.3	Any worker members	72

D.02. Are meetings regularly scheduled (e.g. monthly, quarterly, etc.)?	90.8	Yes	73
	9.2	No	

D.03. Are additional meetings called when needed?	91.1	Yes	74
	8.9	No	

D.04. How long is the average JHSC meeting? (GIVE BEST ESTIMATE) mean = 71.74 Minutes (in minutes) 75

	% 'Yes'		
D.05. Who usually determines what will be on the agenda for meetings? (CHECK ALL THAT APPLY)	34.0	Chairman/co-chairmen only	80*
	78.1	Any management member can suggest items	
	85.5	Any worker member can suggest items	82

D.06. Who usually approves the final draft of minutes? (CHECK ONE)	28.7	Chairman/co-chairmen only	
	8.1	A management member	
	1.6	A worker member	
	17.2	At least one management and one worker member	87
	28.1	Entire JHSC	
	13.7	There is no approval process	
	2.7	THERE ARE NO MINUTES	

D.07. How many management members usually attend each meeting? mean = 2.68 89

D.08. On average, about how many hours per month do management members spend on JHSC business (meetings, inspections, etc.)? (PROVIDE BEST ESTIMATE OF NUMBER) mean = 9.17 Hours per member 90

	% 'Yes'		
D.09. What are the usual reasons for non-attendance at meetings? (CHECK ALL THAT APPLY)	24.9	Shift-work schedules conflict	93*
	26.9	Other conflict with work demands	
	3.6	Lack of interest	
	25.2	Illness/absence	
	45.6	DOES NOT APPLY, ALL MEMBERS ATTEND REGULARLY	97

D.10. How would you rate management and worker members of the JHSC as regards the following: (CIRCLE ONE FOR EACH OF (a) AND (b))

		EQUAL		
(a) general influence in the JHSC (ability to direct discussion and influence decisions)	MANAGERS HAVE MORE INFLUENCE	mean = 3.78	WORKERS HAVE MORE INFLUENCE	99
(b) influence over JHSC structure and procedures (decisions about things like number of members, rules for meetings, etc.)	MANAGERS HAVE MORE INFLUENCE	mean = 3.55	WORKERS HAVE MORE INFLUENCE	100

E. WORKER JHSC MEMBER INSPECTIONS/INVESTIGATIONS AND AVAILABILITY OF INFORMATION IN THE PAST 12 MONTHS

E.01. How often does a worker member of your JHSC undertake health and safety inspections of the workplace? (CHECK ONE)	9.2%	Once a week/or more often	
	48.3	Once a month	
	9.4	Once every two months	
	17.6	Once every three months	
	5.8	Once every six months	101
	2.4	Once every 12 months	
	7.2	Never ➔ (GO TO E.04)	
	% 'Yes'		
E.02. Who receives worker inspection reports? (CHECK ALL THAT APPLY)	58.9	Worker members of JHSC	109
	76.1	Management members of JHSC	
	15.9	Other workers not on your JHSC	
	33.7	Management outside of JHSC	
	13.0	Union	
	1.2	None of the above	
	9.1	NO REPORTS ARE PROVIDED	115

E.03. Overall, how would you rate your JHSC's success in identifying workplace hazards through inspections? (CIRCLE ONE)

ADEQUATE

POOR mean = 5.15 EXCELLENT 117

INVESTIGATIONS OF WORK REFUSALS AND ACCIDENTS IN THE PAST 12 MONTHS

E.04. How many work refusals (if any) have there been for health and safety reasons in this workplace in the past 12 months? (PROVIDE BEST ESTIMATE OF NUMBER) ____ Work refusals None ➔ (GO TO E.07) Don't know 118

11% report 1 or more

E.05. How often did a worker JHSC member (or worker representative) participate in the investigation of the work refusal(s)? (CHECK ONE)	81.5%	Always	
	12.2	Usually	
	2.3	Sometimes	119
	4.0	Never	
	*	Don't know	
E.06. How often was the Ministry of Labour called in to resolve the work refusal(s)? (CHECK ONE)	18.7%	Always	
	4.4	Usually	
	32.7	Sometimes	121
	44.2	Never	
	*	Don't know	
E.07. Have there been any critical injuries or fatalities in this workplace in the past 12 months? (BY CRITICAL INJURIES WE MEAN ANY ACCIDENT WHERE THE ACCIDENT: (1) jeopardizes life; (2) produces unconsciousness; (3) or results in substantial loss of blood; or a fractured leg or arm; or amputation of leg, arm, hand or foot; or burns to a major portion of the body; or results in loss of sight in an eye.	10.3%	Yes	
	89.7	No ➔ (GO TO E.10)	122
	*	Don't know ➔ (GO TO E.08)	

(a) How many fatalities? ____ Don't know 123
(WRITE IN "O" IF NONE) less than 1% report 1 or more fatalities

(b) How many critical injuries? ____ Don't know 124
(WRITE IN "O" IF NONE) 10.6% report 1 or more critical injuries

E.08. In the past 12 months, how often was your JHSC informed of the above critical injuries/fatalities? (CHECK ONE)	95.8%	Always	125
	.6	Usually	
	.4	Sometimes	
	3.1	Never	
E.09. In the past 12 months, how often did a worker JHSC member take part in the investigation of the above critical injuries/fatalities? (CHECK ONE)	75.0%	Always	126
	6.9	Usually	
	5.8	Sometimes	
	12.3	Never	

INFORMATION

		ADEQUATE		135
E.10. Is the type of information available to your JHSC satisfactory? (CIRCLE ONE)	NOT SATISFACTORY	mean = 4.89	FULLY SATISFACTORY	
E.11. Is the amount of information available to your JHSC satisfactory? (CIRCLE ONE)	NOT SATISFACTORY	mean = 4.89	FULLY SATISFACTORY	136

F. DESIGNATED SUBSTANCES AND OTHER HAZARDS

	% 'Yes'		
F.01. Which (if any) of the following designated substances are present in the workplace? (CHECK ALL THAT APPLY)	19.6	Asbestos	137
	10.4	Isocyanates	
	22.0	Lead	
	18.8	Mercury	
	17.0	Silica	
	5.5	Vinyl Chloride	
	10.3	Benzene	
	3.5	Acrylonitrile	
	.7	Coke oven emissions	
	47.8	NONE OF THE ABOVE ➔ (GO TO F.03)	
	4.7	Don't know ➔ (GO TO F.03)	147

F.02. Indicate the following regarding each aspect of assessment and control: (CHECK EACH THAT APPLIES FOR (a) TO (i))	Yes, For All	Yes, For Some	No	Don't Know	
(a) Has an assessment been conducted for each of the designated substances which is present?	71.3%	17.1%	11.6% (GO TO F.02(e))	*	148
(b) Did management consult your JHSC in the assessment(s)?	74.3	12.2	13.4	*	
(c) Did each member of your JHSC receive a copy of the assessment(s)?	68.1	15.0	16.9	*	
(d) Did the JHSC make any recommendations about the assessment(s)?	42.3	20.3	37.4	*	
(e) Are control programs in place for the designated substances identified as needing control programs in the workplace?	69.0	17.3	13.7 (GO TO F.03)	*	
(f) Was/is your JHSC consulted about developing the measures and procedures for the control program(s)?	61.5	18.4	20.1	*	
(g) Did the JHSC make recommendations about the control program(s)?	48.9	23.4	27.7	*	
(h) Does your JHSC receive results of workplace testing/monitoring regarding designated substances?	72.2	13.2	14.6	*	
(i) Has the Ministry of Labour been called in to resolve any dispute about an assessment or control program?	12.8	9.8	77.4	*	156

OTHER HEALTH HAZARDS

	% 'Yes'		
F.03. Are any of the following hazardous substances present or used in the workplace? (CHECK ALL THAT APPLY)	57.8	Physical agents (excessive noise, vibration, heat, radiation)	157
	40.3	Toxic chemicals	
	12.5	Biological agents (bacteria, virus)	
	27.9	NONE OF THE ABOVE ➔ (GO TO G.01)	160

	% 'Yes'		
F.04. Does your JHSC do any of the following regarding these hazardous substances? (CHECK ALL THAT APPLY)	53.9	Assess nature of the hazardous substances	161
	70.6	Recommend safety or control programs	
	58.9	Receive results of workplace tests or monitoring	
	6.6	NONE OF THE ABOVE	164

G. JHSC RELATIONS, RECOMMENDATIONS AND REPORTS IN THE PAST 12 MONTHS

RECOMMENDATIONS

G.01. Do management members have authority to agree to your JHSC making a recommendation on their own, or must they seek approval from senior management before agreeing to make a recommendation? (CHECK ONE)	47.9%	Can agree on own	
	11.1	Must seek approval from senior management	165
	41.1	Depends on type of recommendation	
G.02. Approximately how many recommendations has your JHSC made in the past 12 months? (PROVIDE NUMBER WHICH IS BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 11.84	(IF NONE, GO TO G.06)	167
G.03. Approximately how many of these recommendations were, or are now being implemented by management? (PROVIDE BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 10.18		168
G.04. Approximately how many recommendations has your JHSC made in the past 12 months which called for spending by the employer? (PROVIDE BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 7.38	(IF NONE, GO TO G.06)	169
G.05. How many of these more costly recommendations were, or are now being, implemented? (PROVIDE BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 5.57		170
G.06. Has your JHSC been able to deal with the most important health issues, or have many important health issues been avoided or not resolved? (CHECK ONE)	61.6%	All important health issues have been dealt with by JHSC	
	36.0	Most important health issues have been dealt with by JHSC	171
	2.5	Most important health issues have not been dealt with by JHSC	
	*	NO IMPORTANT HEALTH ISSUES ARISE IN THIS WORKPLACE	

G.07. Has your JHSC been able to deal with the most important safety issues, or have many important safety issues been avoided or not resolved? (CHECK ONE)

59.9%	All important safety issues have been dealt with by JHSC	
38.3	Most important safety issues have been dealt with by JHSC	172
1.8	Most important safety issues have not been dealt with by JHSC	
*	NO IMPORTANT SAFETY ISSUES ARISE IN THIS WORKPLACE	

G.08. What are management's usual reasons for rejecting recommendations? (CHECK ALL THAT APPLY)

% 'Yes'		
19.5	Cost	173
7.6	No technology exists	
33.1	Don't believe recommended change is needed	
12.5	Need for engineering/plans, design	
1.1	Management does not explain	
49.3	Management does not reject recommendations	178

JHSC RELATIONSHIPS AND PROCESS IN THE PAST 12 MONTHS

G.09. Indicate for each of these four ratings, the kind of relationships between worker and management sides of this JHSC. (CIRCLE ONE NUMBER FOR EACH)

	IN-BETWEEN		
			179
CONFLICTING	mean = 5.95	COOPERATIVE	
NO MUTUAL RESPECT	mean = 5.99	GOOD MUTUAL RESPECT	
NOT TRUSTING	mean = 5.92	TRUSTING	
HOSTILE	mean = 6.07	FRIENDLY	182

G.10. In the past 12 months, how have these JHSC relationships changed? (CIRCLE ONE)

	SAME		
WORSE NOW	mean = 4.55	BETTER NOW	183

TIMES WHEN AGREEMENT COULD NOT BE REACHED (IF ANY)

G.11. In the past 12 months, have worker members of the JHSC done any of the following things to help resolve an issue that could not be agreed upon? (CHECK ONE BOX FOR EACH OF (a) TO (f))

	Never	Several Times	Many Times	
(a) Proposed forming a sub-committee to review a difficult issue	87.6%	11.4%	1.0%	190
(b) Proposed seeking advice from outside experts	62.4	35.2	2.4	191
(c) Proposed seeking additional information from managers or workers outside of the JHSC	54.2	41.7	4.1	192
(d) Found out how an issue was dealt with in another workplace	71.5	27.3	1.3	193
(e) Provided information the JHSC needed	48.6	44.4	6.9	194
(f) Proposed new solutions to an issue	36.7	55.1	8.2	195

G.12. In the past 12 months, have worker members of your JHSC (or their union/association if any) done any of the following types of negotiating to get agreement on issues your JHSC could not agree on? (CHECK ONE BOX FOR EACH OF (a) TO (e))

	Never	Several Times	Many Times	
(a) Indicated that previous agreements related to health and safety improvements might be withdrawn or delayed	96.7%	3.3%	.0%	201
(b) Indicated would take issue to collective bargaining	94.3	5.4	.3	202
(c) Indicated would present grievances on health and safety	91.8	7.7	.5	203
(d) Indicated would take an issue to Ministry of Labour	84.8	13.8	1.4	204
(e) Indicated would go to press/media	98.6	1.4	.0	205

REPORTING

G.13. How often do management members of your JHSC report to managers not on your JHSC regarding joint health and safety matters? (CHECK ONE)

57.4%	Monthly or more often	206
21.8	Every three months	
4.5	Every six months	
3.0	Once every 12 months	
13.4	Never	

G.14. What is done with your JHSC's minutes/reports? (CHECK ALL THAT APPLY)

% 'Yes'		208
63.1	Posted in the workplace	
25.5	Distributed to workers	
57.4	Distributed to managers	
14.5	None of the above	211

H. THE EMPLOYER (PRIVATE FIRM OR PUBLIC SECTOR EMPLOYER)

H.01. Which of the following best describes the employer? (CHECK ONE)

75.9%	A private sector company	212
8.1	A non-profit organization	
6.0	A public (crown) corporation	
10.1	A government agency ➔ (GO TO H.03)	

H.02. Please indicate if this workplace is: (CHECK ONE)

34.5%	The only operation of the corporation/firm	
17.9	Part of operations across Ontario	213
13.2	Part of operations across Canada	
34.3	Part of operations in Canada and other countries	

H.03. Please assess in your opinion how each of these ratings best describes this workplace's financial/economic performance in the past 12 months: (CIRCLE ONE NUMBER FOR EACH RATING)

	OPERATING AT PARTIAL CAPACITY	mean = 5.36	OPERATING AT FULL CAPACITY	214
	REDUCING OPERATIONS	mean = 4.79	EXPANDING OPERATIONS	
	LAYING OFF WORKERS	mean = 4.58	HIRING WORKERS	
Not applicable (government or non-profit organization)	OPERATING UNPROFITABLY	mean = 4.89	OPERATING PROFITABLY	217

H.04. Please assess each of the following as regards management in general (not just members of your JHSC): (CIRCLE ONE NUMBER FOR EACH RATING)

		ADEQUATE		
(a) general knowledge of Occupational Health and Safety Act and regulations	POOR	mean = 4.57	EXCELLENT	218
(b) understanding of and concern for safety hazards in this type of workplace	POOR	mean = 5.37	EXCELLENT	219
(c) understanding of and concern for health hazards in this type of workplace	POOR	mean = 5.32	EXCELLENT	220
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)	POOR	mean = 5.02	EXCELLENT	221

MANAGEMENT'S HEALTH AND SAFETY POLICIES/PROGRAMS
OVER THE PAST 12 MONTHS

H.05. Does the employer have a health and safety policy or program? (CHECK ONE)

84.4% Yes
15.6 No → (GO TO H.09) 222
* Don't know → (GO TO H.09)

H.06. Does the employer's policy/program include: (CHECK ALL THAT APPLY)

% 'Yes'		
52.1	Health and Safety Department or staff	223
41.5	Formal training	
52.8	System for employee input	
75.5	Workplace inspections	
56.2	Written job/safety practices/procedures	
75.1	Reporting and investigation of accidents	
53.0	Information on toxic substances and physical hazards control	
23.9	Safety/health performance appraisals for managers	
59.5	Emergency procedures	
.2	NONE OF THE ABOVE	232

H.07. Is the employer's health and safety program/policy written?

63.3% Yes 233
36.7 No → (GO TO H.09)

H.08. Is the written program/policy distributed to or easily available to all workers? (CHECK ONE)

18.0% Distributed to all workers
39.1 Available to all workers 234
42.9 Not available at all

H.09. Overall, how would you rate management's health and safety policy/program or efforts? (CIRCLE ONE)

	ADEQUATE		
POOR	mean = 5.09	EXCELLENT	235

I. EMPLOYEES/WORKFORCE DURING THE PAST 12 MONTHS

I.01. Has the turnover of workers in the past 12 months been low or high? (CIRCLE ONE)	LOW TURNOVER	mean = 2.38	HIGH TURNOVER	236
I.02. What is the level of experience of workers in this workplace (e.g. years of experience in this type of industry)? (CIRCLE ONE)	LOW IN EXPERIENCE	mean = 5.22	HIGH IN EXPERIENCE	237

I.03. Do any of the following present problems for your JHSC, either in getting information from, or getting information to, people in the workplace? (By majority language is meant the language spoken by most managers and workers) (CHECK ONE BOX FOR EACH OF (a) TO (d))

	Major Problem	Minor Problem	No Problem	
(a) Workers' inability to speak majority language of the workplace	1.5%	16.3%	82.2%	238
(b) Managers' inability to speak majority language of the workplace	.7	5.6	93.7	239
(c) Workers' inability to read and write majority language of the workplace	2.5	20.4	77.1	240
(d) Managers' inability to read and write majority language of the workplace	.6	4.6	94.8	241

I.04. Please assess each of the following as regards workers in general (not just members of your JHSC): (CIRCLE ONE NUMBER FOR EACH RATING)

		ADEQUATE		
(a) general knowledge of Occupational Health and Safety Act and regulations	POOR	mean = 3.67	EXCELLENT	242
(b) understanding of and concern for safety hazards in this type of workplace	POOR	mean = 4.47	EXCELLENT	243
(c) understanding of and concern for health hazards in this type of workplace	POOR	mean = 4.44	EXCELLENT	244
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)	POOR	mean = 4.37	EXCELLENT	245

J. LABOUR RELATIONS (DEALINGS BETWEEN MANAGEMENT AND WORKERS, WHETHER UNIONIZED OR NOT) IN THE PAST 12 MONTHS

J.01. Is there a union in this workplace? (CHECK ONE)

50.0% Yes, one
13.7 Yes, more than one (SPECIFY HOW MANY UNIONS ____) 246
36.3 No ➔ (GO TO J.07)

J.02. Overall, how would you rate the union(s) approach to collective bargaining in this workplace? (CIRCLE ONE NUMBER FOR EACH RATING, OR CHECK BOX IF "DON'T KNOW")

			Don't Know	
UNFAIR	mean = 5.15	FAIR	*	247
DISHONEST	mean = 5.25	HONEST	*	248
WEAK	mean = 5.13	STRONG	*	249

J.03. How many of the management members of the JHSC usually participate in contract negotiations? ____ (IF NONE, WRITE IN "0") 250

48.7% of firms with unions have 1 or more

J.04. Have many grievances on health and safety been presented by the union in the past 12 months? (CHECK ONE) 251

.3% Many
8.4 A few
6.7 Only one
84.7 None
* Don't know

J.05. To what extent are health and safety matters dealt with in existing collective agreements? (CHECK ONE)

5.5%	A great extent	
20.9	A fair amount	
57.9	To a limited extent	252
15.8	Not at all	
*	Don't know	

J.06. Have health and safety proposals been a topic for negotiations in recent collective bargaining negotiations? (CHECK ONE)

1.2%	A great extent	
10.0	A fair amount	
48.0	To a limited extent	253
40.9	Not at all	
*	Don't know	

254

J.07. In your opinion, what is the general quality of labour-management relations in this workplace? (CIRCLE ONE NUMBER FOR EACH RATING, OR CHECK BOX IF "DON'T KNOW")

	IN-BETWEEN		Don't Know
CONFLICTING	mean = 5.43	COOPERATIVE	*
NO MUTUAL RESPECT	mean = 5.43	GOOD MUTUAL RESPECT	*
NOT TRUSTING	mean = 5.28	TRUSTING	*
HOSTILE	mean = 5.53	FRIENDLY	*

257

J.08. What effect has the work of your JHSC had on labour-management relations? (CHECK ONE)

49.2%	Has improved labour management relations	
50.1	Has had no impact	258
.7	Has worsened labour management relations	

J.09. In the past 12 months, how have labour-management relations changed, if at all? (CIRCLE ONE, OR CHECK BOX IF "DON'T KNOW")

	SAME/ UNCHANGED		Don't know
WORSE NOW	mean = 4.34	BETTER NOW	*

259

K. DANGER OF ACCIDENTS AND HAZARDS

K.01. In your opinion, what is the danger of accidents occurring in this workplace? (CIRCLE ONE)

	IN-BETWEEN		
NOT DANGEROUS	mean = 3.24	VERY DANGEROUS	260

K.02. In your opinion, what is the danger from health hazards in this workplace? (CIRCLE ONE)

	IN-BETWEEN		
NOT DANGEROUS	mean = 2.60	VERY DANGEROUS	261

K.03. How do health and safety conditions at this workplace compare to other similar workplaces in your industry? (CIRCLE ONE, OR CHECK BOX IF "DON'T KNOW")

	SAME		Don't know
LESS DANGEROUS	mean = 3.16	MORE DANGEROUS	*

262

K.04. How do health and safety conditions at this workplace compare to workplaces in general in Ontario? (CIRCLE ONE, OR CHECK BOX IF "DON'T KNOW")

	SAME		Don't know
LESS DANGEROUS	mean = 2.93	MORE DANGEROUS	*

263

L. MINISTRY OF LABOUR ROLE

L.01. On average, about how often is the workplace inspected by the Ministry of Labour? (CHECK ONE)	20.4%	Every 3 months	
	35.7	Every 6 months	
	36.0	Every 12 months	264
	5.4	Every 24 months	
	2.6	Every 36 months	
	*	Don't know	

L.02. How often do management members of your JHSC accompany Ministry of Labour Inspectors when they inspect the workplace? (CHECK ONE)	75.4%	Always	
	11.6	Usually	263
	8.5	Sometimes	
	4.5	Never	

L.03. Have any orders been issued by Ministry Inspectors for this workplace in the past 12 months?	60.9%	Yes	
	39.1	No	267

L.04. Are copies of Ministry inspection reports available to your JHSC?	98.7%	Yes	
	1.3	No	268
		Not applicable	

L.05. Are copies of Ministry orders available to your JHSC?	98.8%	Yes	
	1.2	No	
		Not applicable	269

	% 'Yes'		
L.06. Do management or workers (or union) ever appeal Ministry orders or the Ministry's failure to issue orders? (CHECK ALL THAT APPLY)	7.4	Yes, management appeals Ministry orders or lack of orders	271
	2.9	Yes, workers (or union) appeal orders or lack of orders	
	85.5	No, neither appeals	273

L.07. Do Ministry Inspectors do the following? (CHECK ONE ANSWER FOR EACH OF (a) to (g))

	Never	Sometimes	Usually	Always	Don't Know	
(a) review JHSC minutes	7.3%	14.2%	24.2%	54.2%	*	274
(b) provide referrals to other organizations or other branches of the Ministry for information/assistance	21.3	48.3	16.4	14.0	*	
(c) give advice on how to improve JHSC effectiveness	20.4	39.0	23.3	17.2	*	
(d) follow-up on previous orders or suggestions	6.9	6.0	26.9	60.2	*	
(e) discuss results of inspections with management members of JHSC	8.8	10.0	19.1	62.1	*	
(f) ask if there are any other outstanding problems that should be reviewed	5.4	9.[illegible]	18.0	67.0	*	
(g) attempt to resolve disputes which have arisen in the JHSC	48.3	16.2	13.6	21.8	*	280

M. IMPACT OF JHSC (JOINT HEALTH AND SAFETY COMMITTEE) ON HEALTH AND SAFETY

M.01. Thinking of your workplace as it is today, please assess the impact of your JHSC in each of the following areas:
(CIRCLE ONE NUMBER FOR EACH RATING)

		ADEQUATE		
(a) overall record in improving safety and reducing accidents	POOR	mean = 4.83	EXCELLENT	281
(b) overall record in reducing potential health hazards	POOR	mean = 4.99	EXCELLENT	282
(c) ability to obtain necessary changes in equipment, materials and work practices to improve health and safety	POOR	mean = 5.21	EXCELLENT	283
(d) ability to improve health and safety knowledge and concern among workers	POOR	mean = 4.73	EXCELLENT	284
(e) ability to improve health and safety knowledge and concern among management, including supervisory staff	POOR	mean = 4.85	EXCELLENT	285

M.02. Please assess whether the following aspects of health and safety in this workplace are worse now, or better now than they were 5 years ago:
(CIRCLE ONE NUMBER FOR EACH RATING)

		UNCHANGED		
(a) danger from accidents (now as compared to 5 years ago)	WORSE NOW	mean = 5.52	BETTER NOW	286
(b) danger from health hazards (now as compared to 5 years ago)	WORSE NOW	mean = 5.48	BETTER NOW	287
(c) management and worker understanding of, and concern for health and safety (now as compared to 5 years ago)	WORSE NOW	mean = 5.71	BETTER NOW	288

M.03. Please assess whether the following aspects of health and safety in this workplace are worse now, or better now, than they were 12 months ago:
(CIRCLE ONE NUMBER FOR EACH RATING)

		UNCHANGED		
(a) danger from accidents (now as compared to 12 months ago)	WORSE NOW	mean = 4.92	BETTER NOW	289
(b) danger from health hazards (now as compared to 12 months ago)	WORSE NOW	mean = 4.93	BETTER NOW	290
(c) management and worker understanding of, and concern for health and safety (now as compared to 12 months ago)	WORSE NOW	mean = 5.12	BETTER NOW	291

N. OVERALL EVALUATION

N.01. In your opinion, is your JHSC working, or not working in improving the protection and safety of workers? (CHECK ONE)

10.5% The JHSC works extremely well and could not be better ➔ (GO TO O.01)
51.2 The JHSC is working well
32.2 The JHSC is working adequately 292
5.7 The JHSC is weak, not working effectively
.3 The JHSC is poor, cannot function at all

N.02. To what extent would the following things improve your JHSC, to make it work better? (CHECK ONE BOX FOR EACH OF (a) TO (s))

	Would Not Help	Would Help a Little	Would Help a Lot	
(a) More representation on JHSC from management	73.7%	21.2%	5.1%	293
(b) More representation from workers	68.9	23.3	7.8	
(c) More support/input from workers generally	24.6	39.9	35.5	
(d) More support/input from management generally	37.5	41.6	20.9	296
(e) More regular and frequent meetings	76.5	17.1	6.5	297
(f) Better JHSC procedures (written agenda, minutes, etc.)	70.6	23.3	6.1	
(g) More training on safety issues	21.1	49.3	29.6	
(h) More training on health issues	25.4	47.5	27.0	300
(i) More time to study technical information	46.8	38.8	14.4	301
(j) Better inspection procedures	53.5	35.9	10.6	
(k) More or better in-house health and safety staff	55.9	30.8	13.3	
(l) More or better outside experts/advisors	50.9	37.5	11.6	304
(m) More information on health and safety matters	37.1	46.2	16.7	305
(n) More authority/independence for JHSC	68.4	22.6	9.1	
(o) More support by management to pay for recommendations	63.2	25.8	11.0	
(p) Stronger enforcement of legislation by Ministry of Labour	74.8	18.0	7.2	308
(q) More help/advice from Ministry of Labour	54.9	34.0	11.1	309
(r) Better labour/management relations	65.7	24.2	10.1	
(s) Better working relationships between worker and management JHSC members	71.8	20.1	8.1	311

O. COMPLETION OF THE QUESTIONNAIRE

O.01. Was this questionnaire completed with or without consultation with other JHSC members? (CHECK ALL THAT APPLY)

% yes
24.0 Completed in consultation with management members 312
9.5 Completed in consultation with worker members
71.0 No consultation with management or worker members
314

Thank you for taking the time to complete this important questionnaire. We would appreciate hearing about anything else you feel we should know about your joint health and safety committee. Please feel free to attach your additional comments to this questionnaire and return it in the postage-paid envelope provided.

SURVEY OF JOINT HEALTH AND SAFETY COMMITTEES IN ONTARIO

A Study by the Ontario Advisory Council on Occupational Health and Occupational Safety

QUESTIONNAIRE FOR WORKER MEMBERS OF THE JOINT HEALTH AND SAFETY COMMITTEE FOR:

INSTRUCTIONS

HOW TO COMPLETE THE QUESTIONNAIRE

Please read these instructions before beginning. Note that questions appear on the left side of the page, with the answers usually appearing on the right side of the page. Some answers are placed below questions and are pointed to by arrows.

For most questions: Simply indicate your answer by checking the box next to the answer which is best for your committee (most accurate, or best estimate of worker members' views), or write in the answer which is correct for you.

For special 1 to 7 rating scales:

Some questions ask you to indicate your answer on a 7 point scale, for example:

Q. Are health and safety issues simple or complicated?

SIMPLE 1 2 3 4 5 6 7 COMPLICATED

To answer such a question, you would circle the

"1" if you thought the best answer was "very simple",

"2" or "3" would indicate that the answer was fairly simple, but not "very simple",

"4" if you thought the best answer was "in between", or if you weren't sure,

"5" or "6" would indicate that the answer was "fairly complicated",

"7" if you thought the best answer was "very complicated".

(INSTRUCTIONS CONTINUE ON THE BACK OF THIS PAGE)

ESTIMATES ARE SATISFACTORY: For questions like "how many meetings has the committee had in the past 12 months?", provide your best estimate, do not bother to check minutes or records.

IF NONE OF THE ANSWERS ARE QUITE RIGHT FOR YOUR COMMITTEE: In some cases, the answers we have provided will not explain what you want to tell us. In those cases, check or circle the "best" answer we have provided, and then write in any extra comments you have.

SKIP INSTRUCTIONS: Some of the answers you check or circle are followed by instructions to "go to" a question number or section further on in the questionnaire. This means you should "skip" a set of questions which will not apply to your committee. Please follow these carefully, and only skip where the specific answer you check is followed by a skip instruction.

DEFINITIONS:

JHSC: Always refers to the joint health and safety committee for the workplace which is printed on the label on the front page of the questionnaire. This means the whole joint health and safety committee, including both worker and management members together.

Worker Members: Always refers to the members of the JHSC who are workers (not management, not supervisory staff), and who represent the worker "side" of the JHSC.

Management Members: Always refers to the members of the JHSC, who are management (senior or middle management, or supervisory staff), and who represent the management "side" of the JHSC.

The Workplace: The name of the workplace is printed on the label on the front page of the questionnaire.

You/your: Always refers to the worker members of your JHSC.

Ministry: Always refers to the Ontario Ministry of Labour.

ALL INFORMATION IS STRICTLY CONFIDENTIAL

The Council has taken extensive steps to assure confidentiality of your answers, even from the Ministry of Labour.

To assure confidentiality within the workplace, Management members completing the questionnaire should not ask to see the worker member(s)' questionnaire or answers, and worker members have been requested not to ask to see the management member(s)' completed questionnaire.

PLEASE FILL OUT THE QUESTIONNAIRE AND MAIL IT BACK AS SOON AS POSSIBLE.

THANK YOU VERY MUCH FOR YOUR ASSISTANCE WITH THIS STUDY.

A. JOINT HEALTH AND SAFETY COMMITTEE (JHSC) RESPONSIBILITIES AND STRUCTURE

A.01. Which of the following are regarded by your Joint Health and Safety Committee (JHSC) as its duties or responsibilities? (CHECK ALL THAT APPLY)

% 'Yes'		
91.2	Inspect workplace	1
79.6	Accompany Ministry inspectors	
74.9	Review Ministry inspection reports	
30.8	Review new technology/processes/substances before they are used in the workplace	
37.0	Review assessment and control programs for designated substances	
66.8	Review company health and safety programs/policies	
37.5	Get information on health and safety practices in similar workplaces	
63.2	Get information on existing workplace hazards	
50.6	Investigate work refusals	
72.0	Investigate accidents	
36.5	Develop educational/training programs for workers	
18.7	Develop educational/training programs for management	
24.7	Monitor health and safety practices of outside contractors in the workplace	
.9	NONE OF THE ABOVE	14

A.02. Overall, is your JHSC regarded by your members as: (CHECK ALL THAT APPLY)

% 'Yes'		
35.0	A decison-making body	22
64.9	An advisory body	
62.4	An information sharing body	24

B. JHSC MEMBERS

B.01. How many WORKER members are on your JHSC? mean = 5.14 31

B.02. How are worker members selected? (CHECK ONE)

19.0%	Appointed by management	
16.2	Management acceptance of volunteers	
18.1	Appointed by union executive	32
2.3	Appointed by employee association executive	
31.7	Chosen by workers at election	
12.7	Accepted by workers at a meeting where volunteers come forward	

B.03. Are names of JHSC members posted or publicized where every worker can easily see them?

77.0%	Yes	33
23.0	No	

C. EXPERIENCE, TRAINING, AND ATTITUDES OF JHSC MEMBERS

C.01. How many worker members of your JHSC have had the following amounts of health and safety training under any program? (WRITE IN THE NUMBER OF WORKER MEMBERS NEXT TO EACH CATEGORY, PROVIDE BEST ESTIMATE)

mean		
1.24	A 1 to 2 day seminar/course (6 to 16 hours)	38
.25	A course of 3 - 4 days (17 to 29 hours)	
.28	A course of more than 4 days (over 29 hours)	
% 'Yes'		
45.6	WORKER MEMBERS HAVE HAD NO SUCH TRAINING	41

	% 'Yes'		
C.02. What types of formal training have been provided to worker JHSC members? (CHECK ALL THAT APPLY)	36.9	Training on Occupational Health & Safety Act	51
	33.4	Accident prevention, causation and investigation	
	34.7	Hazard recognition	
	15.0	Industrial hygiene	
	13.4	Assessment and control programs for designated substances	
	36.2	Inspections	
	16.1	Problem solving techniques	
	38.8	WORKER MEMBERS HAVE HAD NO SUCH TRAINING	58

C.03. Please assess management members of your JHSC as to: (CIRCLE ONE FOR EACH OF (a) TO (d))

		ADEQUATE		
(a) general knowledge of Occupational Health and Safety Act and regulations	POOR	mean = 4.48	EXCELLENT	61
(b) understanding of and concern for safety hazards in this type of workplace	POOR	mean = 4.88	EXCELLENT	62
(c) understanding of and concern for health hazards in this type of workplace	POOR	mean = 4.73	EXCELLENT	63
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)	POOR	mean = 4.74	EXCELLENT	64

D. JHSC (JOINT HEALTH AND SAFETY COMMITTEE) MEETINGS IN THE PAST 12 MONTHS

D.01. How many times has your JHSC met in the past 12 months? mean = 7.26 69

	% 'Yes'		
D.02. Who can call JHSC meetings? (CHECK ALL THAT APPLY)	49.2	Chairman or co-chairmen only	70
	50.4	Any management members	
	42.4	Any worker members	72
D.03. Are meetings regularly scheduled (e.g. monthly, quarterly, etc.)?	80.6%	Yes	73
	19.4	No	
D.04. Are additional meetings called when needed?	75.1%	Yes 24.9% No	74
D.05. Is there a chairman or co-chairmen? (CHECK ONE)	60.8%	One chairman	
	19.3	Two co-chairmen (1 management, 1 worker) → (GO TO D.08)	76
	19.9	No formal chairman or co-chairmen → (GO TO D.09)	
D.06. How is the chairman selected? (CHECK ONE)	25.3%	Vote of JHSC	
	9.8	Rotates between management and worker members	77
	62.5	Appointed by management	
	2.5	Appointed by union	
D.07. Is the chairman always from management? (CHECK ONE)	51.5%	Always from management	
	6.3	Always from workers	78
	42.3	Can be from workers or management	
D.08. How is the worker co-chairman selected? (CHECK ONE)	19.0	Vote of worker members	
	3.0	Vote of workers who are represented, but not on JHSC	79
	18.3	Management appointment	
	6.7	Always holder of a specific union position	
	53.0	Not applicable	

D.09. Who usually determines what will be on the agenda for meetings? (CHECK ALL THAT APPLY)

% 'Yes'		
24.8	Chairman/co-chairmen only	80
66.9	Any management member can suggest items	
83.4	Any worker member can suggest items	82

D.10. How often does the JHSC: (CHECK ONE ANSWER FOR EACH OF (a) TO (d))

	Never	Sometimes	Usually	Always	
(a) have a written agenda for meetings	17.2%	17.1%	17.1%	48.6%	83
(b) take written minutes of meetings	6.3	3.3	8.8	81.5	84
(c) attach action plans to recommendations	12.4	20.0	21.2	46.3	85
(d) set dates for implementing recommendations	20.7	25.1	24.2	30.0	86

D.11. Who usually approves the final draft of minutes? (CHECK ONE)

22.8%	Chairman/co-chairmen only	
14.3	A management member	
4.4	A worker member	
14.1	At least one management and one worker member	87
24.8	Entire JHSC	
13.8	There is no approval process	
5.7	THERE ARE NO MINUTES	

D.12. How many worker members usually attend each meeting? mean = 3.74 88

D.13. On average, about how many hours per month do worker members spend on JHSC business (meetings, inspections, etc.)? (PROVIDE BEST ESTIMATE OF NUMBER) mean = 15.21 Hours per member 91

D.14. Are workers paid for all of these hours? (CHECK ONE)

80.8%	All	
5.9	Most	92
4.3	Some	
9.0	None	

D.15. What are the usual reasons for non-attendance at meetings? (CHECK ALL THAT APPLY)

% 'Yes'		
29.7	Shift-work schedules conflict	93
26.1	Other conflict with work demands	
6.3	Lack of interest	
27.5	Illness/absence	
39.4	DOES NOT APPLY, ALL MEMBERS ATTEND REGULARLY	97

D.16. How often do worker members meet together before JHSC meetings to plan their strategy? (CHECK ONE)

7.7%	Always	
7.6	Usually	98
29.5	Sometimes	
55.2	Never	

D.17. How would you rate management and worker members of the JHSC as regards the following: (CIRCLE ONE FOR EACH OF (a) AND (b))

		EQUAL		
				99
(a) general influence in the JHSC (ability to direct discussion and influence decisions)	MANAGERS HAVE MORE INFLUENCE	mean = 3.75	WORKERS HAVE MORE INFLUENCE	
(b) influence over JHSC structure and procedures (decisions about things like number of members, rules for meetings etc.)	MANAGERS HAVE MORE INFLUENCE	mean = 3.54	WORKERS HAVE MORE INFLUENCE	
				100

E. WORKER JHSC MEMBER INSPECTIONS/INVESTIGATIONS AND AVAILABILITY OF INFORMATION IN THE PAST 12 MONTHS

E.01.	How often does a worker member of your JHSC undertake health and safety inspections of the workplace? (CHECK ONE)	10.5%	Once a week/or more often	
		44.4	Once a month	
		7.8	Once every two months	
		17.1	Once every three months	101
		5.2	Once every six months	
		3.9	Once every 12 months	
		11.1	Never ➔ (GO TO E.08)	
E.02.	Do any of the following persons usually accompany the worker JHSC member(s) on inspections? (CHECK ALL THAT APPLY)	51.0	Management members of JHSC	102
		9.3	Union staff	
		18.8	Other workers	
		21.7	Other managers/supervisors	
		19.0	No other persons	106
E.03.	Is the inspection guided by a procedure that workers have been trained on, or by a written plan for items to review, questions to ask, etc.?	51.8%	Yes	107
		48.2	No	
E.04.	Does the worker JHSC member provide written and/or spoken reports after inspections? (CHECK ONE)	24.0%	Written only	
		19.1	Spoken only	108
		50.9	Both written and spoken reports	
		6.0	NO REPORTS ARE PROVIDED ➔ (GO TO E.06)	
E.05.	Who receives worker inspection reports? (CHECK ALL THAT APPLY)	52.1	Worker members of JHSC	109
		69.0	Management members of JHSC	
		15.0	Other workers not on your JHSC	
		30.0	Management outside of JHSC	
		12.8	Union	
		1.0	None of the above	
		5.5	NO REPORTS ARE PROVIDED	115
E.06.	Do JHSC members follow-up on previous inspections to see if previously identified problems have been solved? (CHECK ONE)	60.6%	Always	
		28.9	Usually	116
		8.0	Sometimes	
		2.5	Never	
E.07.	Overall, how would you rate your JHSC's success in identifying workplace hazards through inspections? (CIRCLE ONE)		ADEQUATE	
			POOR mean = 5.26 EXCELLENT	117

INVESTIGATIONS OF WORK REFUSALS AND ACCIDENTS IN THE PAST 12 MONTHS

E.08.	How many work refusals (if any) have there been for health and safety reasons in this workplace in the past 12 months? (PROVIDE BEST ESTIMATE OF NUMBER)	___ Work refusals	None ➔ (GO TO E.12) Don't know	118
		16% report 1 or more		
E.09.	How often did a worker JHSC member (or worker representative) participate in the investigation of the work refusal(s)? (CHECK ONE)	56.6%	Always	
		18.5	Usually	
		9.7	Sometimes	119
		15.2	Never	
		*	Don't Know	

E.10. In the past 12 months, have any workers ever been fired, suspended or disciplined for work refusals? 120

8.8% Yes
91.2 No

E.11. How often was the Ministry of Labour called in to resolve the work refusal(s)? (CHECK ONE) 121

11.5% Always
5.0 Usually
24.1 Sometimes
59.4 Never
* Don't know

E.12. Have there been any critical injuries or fatalities in this workplace in the past 12 months? (BY CRITICAL INJURIES WE MEAN ANY ACCIDENT WHERE THE ACCIDENT: (1) jeopardizes life; (2) produces unconsciousness; (3) or results in substantial loss of blood; or a fractured leg or arm; or amputation of leg, arm, hand or foot; or burns to a major portion of the body; or results in loss of sight in an eye. 122

20.7% Yes
79.3 No → (GO TO E.15)
* Don't know → (GO TO E.13)

(a) How many fatalities? ___ Don't know 123
(WRITE IN "O" IF NONE) less than 1% report 1 or more fatalities

(b) How many critical injuries? ___ Don't know 124
(WRITE IN "O" IF NONE) 16% report 1 or more critical injuries

E.13. In the past 12 months, how often was your JHSC informed of the above critical injuries/fatalities? (CHECK ONE) 125

58.2% Always
14.2 Usually
8.6 Sometimes
18.9 Never

E.14. In the past 12 months, how often did a worker JHSC member take part in the investigation of the above critical injuries/fatalities? (CHECK ONE) 126

42.8% Always
10.9 Usually
10.8 Sometimes
35.5 Never

INFORMATION

E.15. Are the following types of information available to your JHSC? (CHECK ONE ANSWER FOR EACH OF (a) to (h))

	Yes	No	Does Not Apply	
(a) Proprietary (trade secrets) information relevant to health and safety problems	37.1%	26.7%	36.2%	127
(b) Information from workplace doctor/nurse/industrial hygienist	37.5	26.6	35.8	128
(c) Workplace testing/monitoring information	55.6	19.3	25.0	129
(d) Information on designated substances	64.0	17.7	18.3	130
(e) Information on toxic substances	65.5	17.6	16.9	131
(f) Information on machinery, new technology	60.9	27.6	11.5	132
(g) Material safety data sheets	62.3	23.0	14.8	133
(h) Yearly company accident and health statistics	70.3	21.8	7.9	134

E.16. Is the type of information available to your JHSC satisfactory? (CIRCLE ONE)	NOT SATISFACTORY	ADEQUATE mean = 4.38	FULLY SATISFACTORY	135
E.17. Is the amount of information available to your JHSC satisfactory? (CIRCLE ONE)	NOT SATISFACTORY	ADEQUATE mean = 4.24	FULLY SATISFACTORY	136

F. DESIGNATED SUBSTANCES AND OTHER HAZARDS

	% 'Yes'		
F.01. Which (if any) of the following designated substances are present in the workplace? (CHECK ALL THAT APPLY)	18.9	Asbestos	137
	10.8	Isocyanates	
	24.6	Lead	
	16.5	Mercury	
	18.9	Silica	
	4.6	Vinyl Chloride	
	12.7	Benzene	
	4.1	Acrylonitrile	
	1.7	Coke oven emissions	
	36.7	NONE OF THE ABOVE ➔ (GO TO F.03)	
	18.4	Don't know ➔ (GO TO F.03)	147

F.02. Indicate the following regarding each aspect of assessment and control: (CHECK EACH THAT APPLIES FOR (a) TO (i))	Yes, For Some	Yes, For All	No	Don't Know	
(a) Has an assessment been conducted for each of the designated substances which is present?	58.4%	26.3%	15.4% (GO TO F.02(e))	*	148
(b) Did management consult your JHSC in the assessment(s)?	60.4	17.2	22.4	*	149
(c) Did each member of your JHSC receive a copy of the assessment(s)?	50.5	12.4	37.1	*	150
(d) Did the JHSC make any recommendations about the assessment?	45.5	22.2	32.3	*	151
(e) Are control programs in place for the designated substances identified as needing control programs in the workplace?	53.1	20.9	26.0 (GO TO F.03)	*	152
(f) Was your JHSC consulted about developing the measures and procedures for the control program(s)?	48.3	19.2	32.4	*	153
(g) Did the JHSC make recommendations about the control program(s)?	45.2	24.4	30.5	*	154
(h) Does your JHSC receive results of workplace testing/monitoring regarding designated substances?	60.9	20.6	18.5	*	155
(i) Has the Ministry of Labour been called in to resolve any dispute about an assessment or control program?	12.8	14.8	72.5	*	156

OTHER HEALTH HAZARDS

	% 'Yes'		
F.03. Are any of the following hazardous substances present or used in the workplace? (CHECK ALL THAT APPLY)	66.9	Physical agents (excessive noise, vibration, heat, radiation)	157
	49.4	Toxic chemicals	
	17.5	Biological agents (bacteria, virus)	
	20.4	NONE OF THE ABOVE ➔ (GO TO G.01)	160
F.04. Does your JHSC do any of the following regarding these hazardous substances? (CHECK ALL THAT APPLY)	45.6	Assess nature of the hazardous substances	161
	63.3	Recommend safety or control programs	
	51.5	Receive results of workplace tests or monitoring	
	13.3	NONE OF THE ABOVE	164

G. JHSC RELATIONS, RECOMMENDATIONS AND REPORTS
IN THE PAST 12 MONTHS

RECOMMENDATIONS

G.01. Do worker members have authority to agree to your JHSC making a recommendation on their own, or must they seek approval from those they represent before they can agree to making a recommendation? (CHECK ONE)	52.0%	Can agree on own	
	9.1	Must seek approval from those they represent	166
	38.9	Depends on type of recommendation	
G.02. Approximately how many recommendations has your JHSC made in the past 12 months? (PROVIDE NUMBER WHICH IS BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 11.89	(IF NONE, GO TO G.06)	167
G.03. Approximately how many of these recommendations were, or are now being implemented by management? (PROVIDE BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 8.40		168
G.04. Approximately how many recommendations has your JHSC made in the past 12 months which called for spending by the employer? (PROVIDE BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 6.44	(IF NONE, GO TO G.06)	169
G.05. How many of these more costly recommendations were, or are now being, implemented? (PROVIDE BEST ESTIMATE, INDICATING "O" IF NONE)	mean = 3.83		170
G.06. Has your JHSC been able to deal with the most important health issues, or have many important health issues been avoided or not resolved? (CHECK ONE)	43.4%	All important health issues have been dealt with by JHSC	
	38.6	Most important health issues have been dealt with by JHSC	171
	7.0	Most important health issues have not been dealt with by JHSC	
	11.0	NO IMPORTANT HEALTH ISSUES ARISE IN THIS WORKPLACE	

G.07. Has your JHSC been able to deal with the most important safety issues, or have many important safety issues been avoided or not resolved? (CHECK ONE)

47.9%	All important safety issues have been dealt with by JHSC	
43.2	Most important safety issues have been dealt with by JHSC	172
4.5	Most important safety issues have not been dealt with by JHSC	
4.4	NO IMPORTANT SAFETY ISSUES ARISE IN THIS WORKPLACE	

G.08. What are management's usual reasons for rejecting recommendations? (CHECK ALL THAT APPLY)

35.7	Cost	173
5.0	No technology exists	
33.5	Don't believe recommended change is needed	
14.5	Need for engineering/plans, design	
10.1	Management does not explain	
41.3	Management does not reject recommendations	1178

JHSC RELATIONSHIPS AND PROCESS IN THE PAST 12 MONTHS

G.09. Indicate for each of these four ratings, the kind of relationships between worker and management sides of this JHSC. (CIRCLE ONE NUMBER FOR EACH)

	IN-BETWEEN		
			179
CONFLICTING	mean = 5.43	COOPERATIVE	
NO MUTUAL RESPECT	mean = 5.57	GOOD MUTUAL RESPECT	
NOT TRUSTING	mean = 5.39	TRUSTING	
HOSTILE	mean = 5.68	FRIENDLY	182

G.10. In the past 12 months, how have these JHSC relationships changed? (CIRCLE ONE)

	SAME		
WORSE NOW	mean = 4.44	BETTER NOW	183

TIMES WHEN AGREEMENT COULD NOT BE REACHED (IF ANY)

G.11. In the past 12 months, have management members of the JHSC done any of the following things to help resolve an issue that could not be agreed upon? (CHECK ONE BOX FOR EACH OF (a) TO (f))

	Never	Several Times	Many Times	
(a) Proposed forming a sub-committee to review a difficult issue	83.4%	14.9%	1.7%	184
(b) Proposed seeking advice from outside experts	51.2	44.1	4.7	185
(c) Proposed seeking additional information from managers or workers outside of the JHSC	48.8	46.2	4.9	186
(d) Found out how an issue was dealt with in another workplace	64.6	32.0	3.4	187
(e) Provided information the JHSC needed	37.5	50.0	12.5	188
(f) Proposed new solutions to an issue	35.6	55.0	9.3	189

G.12. In the past 12 months, have management members of your JHSC done any of the following types of negotiating to get agreement on issues your JHSC could not agree on? (CHECK ONE BOX FOR EACH OF (a) TO (e))

	Never	Several Times	Many Times	
(a) Denied a problem was serious	74.0%	20.9%	5.1%	196
(b) Refused to discuss a problem	92.1	6.9	1.0	197
(c) Indicated that previous agreements on health and safety improvements might be withdrawn, or delayed	86.1	11.4	2.5	198
(d) Indicated that an issue threatened closure/layoffs	94.4	4.3	1.3	199
(e) Indicated would take issue to Ministry of Labour	92.3	6.7	1.0	200

REPORTING

G.13. How often do worker members of your JHSC report to workers at meetings where two-way discussion is possible? (CHECK ONE)

37.5%	Monthly or more often	
19.0	Every three months	207
4.2	Every six months	
4.1	Once every 12 months	
35.2	Never	

G.14. What is done with your JHSC's minutes/reports? (CHECK ALL THAT APPLY)

% 'Yes'		
62.2	Posted in the workplace	208
16.0	Distributed to workers	
37.3	Distributed to managers	
18.8	None of the above	211

H. THE EMPLOYER (PRIVATE FIRM OR PUBLIC SECTOR EMPLOYER)

H.01. Please assess each of the following as regards management in general (not just members of your JHSC): (CIRCLE ONE NUMBER FOR EACH RATING)

		ADEQUATE		
(a) general knowledge of Occupational Health and Safety Act and regulations	POOR	mean = 4.28	EXCELLENT	218
(b) understanding of and concern for safety hazards in this type of workplace	POOR	mean = 4.78	EXCELLENT	219
(c) understanding of and concern for health hazards in this type of workplace	POOR	mean = 4.69	EXCELLENT	220
(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations)	POOR	mean = 4.44	EXCELLENT	221

MANAGEMENT'S HEALTH AND SAFETY POLICIES/PROGRAMS OVER THE PAST 12 MONTHS

H.02. Does the employer have a health and safety policy or program? (CHECK ONE)
72.3% Yes
16.9 No ➔ (GO TO I.01)
10.8 Don't know ➔ (GO TO I.01)
222

H.03. Overall, how would you rate management's health and safety policy/program or efforts? (CIRCLE ONE)
ADEQUATE
POOR mean = 4.75 EXCELLENT
235

I. EMPLOYEES/WORKFORCE DURING THE PAST 12 MONTHS

I.01. Do any of the following present problems for your JHSC, either in getting information from, or getting information to, people in the workplace? (By majority language is meant the language spoken by most managers and workers) (CHECK ONE BOX FOR EACH OF (a) TO (d))

	Major Problem	Minor Problem	No Problem	
(a) Workers' inability to speak majority language of the workplace	3.6%	14.5%	81.9%	238
(b) Managers' inability to speak majority language of the workplace	1.8	6.7	91.5	239
(c) Workers' inability to read and write majority language of the workplace	3.7	20.6	75.8	240
(d) Managers' inability to read and write majority language of the workplace	1.7	6.2	92.1	241

I.02. Please assess each of the following as regards workers in general (not just members of your JHSC): (CIRCLE ONE NUMBER FOR EACH RATING)

ADEQUATE

(a) general knowledge of Occupational Health and Safety Act and regulations — POOR mean = 3.42 EXCELLENT 242

(b) understanding of and concern for safety hazards in this type of workplace — POOR mean = 4.17 EXCELLENT 243

(c) understanding of and concern for health hazards in this type of workplace — POOR mean = 4.19 EXCELLENT 244

(d) contribution to the JHSC (identifying hazards, providing information, suggesting recommendations) — POOR mean = 4.28 EXCELLENT 245

J. LABOUR RELATIONS (DEALINGS BETWEEN MANAGEMENT AND WORKERS, WHETHER UNIONIZED OR NOT) IN THE PAST 12 MONTHS

J.01. Is there a union in this workplace? (CHECK ONE)

50.7% Yes, one
11.4 Yes, more than one (SPECIFY HOW MANY UNIONS ___) 246
37.9 No

254

J.02. In your opinion, what is the general quality of labour-management relations in this workplace? (CIRCLE ONE NUMBER FOR EACH RATING, OR CHECK BOX IF "DON'T KNOW")

	IN-BETWEEN		Don't Know
CONFLICTING	mean - 4.84	COOPERATIVE	
NO MUTUAL RESPECT	mean = 4.83	GOOD MUTUAL RESPECT	
NOT TRUSTING	mean = 4.61	TRUSTING	
HOSTILE	mean = 5.12	FRIENDLY	257

J.03. What effect has the work of your JHSC had on labour-management relations? (CHECK ONE)

46.5% Has improved labour management relations
51.2 Has had no impact 258
2.2 Has worsened labour management relations

J.04. In the past 12 months, how have labour-management relations changed, if at all? (CIRCLE ONE, OR CHECK BOX IF "DON'T KNOW")

	SAME/UNCHANGED		Don't know
WORSE NOW	mean = 4.27	BETTER NOW	259

K. DANGER OF ACCIDENTS AND HAZARDS

K.01. In your opinion, what is the danger from accidents in this workplace? (CIRCLE ONE)

	IN-BETWEEN		
NOT DANGEROUS	mean = 3.67	VERY DANGEROUS	260

K.02. In your opinion, what is the danger from health hazards in this workplace? (CIRCLE ONE)

	IN-BETWEEN		
NOT DANGEROUS	mean = 3.48	VERY DANGEROUS	261

K.03. How do health and safety conditions at this workplace compare to other similar workplaces in your industry? (CIRCLE ONE, OR CHECK BOX IF "DON'T KNOW")

	SAME		Don't know
LESS DANGEROUS	mean = 3.43	MORE DANGEROUS	262

K.04. How do health and safety conditions at this workplace compare to workplaces in general in Ontario? (CIRCLE ONE, OR CHECK BOX IF "DON'T KNOW")

	SAME		Don't know
LESS DANGEROUS	mean = 3.37	MORE DANGEROUS	263

L. MINISTRY OF LABOUR ROLE

L.01. On average, about how often is the workplace inspected by the Ministry of Labour? (CHECK ONE)

23.6% Every 3 months
34.7 Every 6 months
33.0 Every 12 months 264
5.9 Every 24 months
2.9 Every 36 months
* Don't know

L.02. How often do worker members of your JHSC accompany Ministry of Labour Inspectors when they inspect the workplace? (CHECK ONE)

65.2% Always
10.7 Usually 266
10.3 Sometimes
13.8 Never

L.03. Have any orders been issued by Ministry Inspectors for this workplace in the past 12 months?

62.8 Yes 267
37.2 No

L.04. Are copies of Ministry inspection reports available to your JHSC?

92.6% Yes
7.4 No 268
* Not applicable

L.05. Are copies of Ministry orders available to your JHSC?

90.8% Yes
9.2 No 269
* Not applicable

L.06. Does your JHSC follow up on Ministry Inspectors' orders to see if they are implemented? (CHECK ONE)

71.0% Always
16.1 Usually 270
5.6 Sometimes
7.3 Never

L.07. Do management or workers (or union) ever appeal Ministry orders or the Ministry's failure to issue orders? (CHECK ALL THAT APPLY)

% 'Yes'
9.0 Yes, management appeals Ministry orders or lack of orders 271
5.5 Yes, workers (or union) appeal orders or lack of orders
76.9 No, neither appeals 273

L.08. Do Ministry Inspectors do the following? (CHECK ONE ANSWER FOR EACH OF (a) to (g))

	Never	Sometimes	Usually	Always	Don't know	
(a) review JHSC minutes	17.6%	17.2%	23.2%	42.0%	*	274
(b) provide referrals to other organizations or other branches of the Ministry for information/assistance	30.6	32.4	22.7	14.3	*	275
(c) give advice on how to improve JHSC effectiveness	24.3	32.2	24.6	18.9	*	276
(d) follow-up on previous orders or suggestions	9.6	10.2	23.6	56.6	*	277
(e) discuss results of inspection with worker members of JHSC	18.8	13.1	20.0	48.1	*	278
(f) ask if there are any other outstanding problems that should be reviewed	10.4	10.3	16.7	62.6	*	279
(g) attempt to resolve disputes which have arisen in the JHSC	50.5	12.3	16.4	20.8	*	280

M. IMPACT OF JHSC ON HEALTH AND SAFETY

M.01. Thinking of your workplace as it is today, please assess the impact of your JHSC in each of the following areas: (CIRCLE ONE NUMBER FOR EACH RATING)

		ADEQUATE		
(a) overall record in improving safety and reducing accidents	POOR	mean = 4.94	EXCELLENT	281
(b) overall record in reducing potential health hazards	POOR	mean = 4.93	EXCELLENT	282
(c) ability to obtain necessary changes in equipment, materials and work practices to improve health and safety	POOR	mean = 4.92	EXCELLENT	283
(d) ability to improve health and safety knowledge and concern among workers	POOR	mean = 4.57	EXCELLENT	284
(e) ability to improve health and safety knowledge and concern among management, including supervisory staff	POOR	mean = 4.46	EXCELLENT	285

M.02. Please assess whether the following aspects of health and safety in this workplace are worse now, or better now than they were 5 years ago: (CIRCLE ONE NUMBER FOR EACH RATING)

		UNCHANGED		
(a) danger from accidents (now as compared to 5 years ago)	WORSE NOW	mean = 5.47	BETTER NOW	286
(b) danger from health hazards (now as compared to 5 years ago)	WORSE NOW	mean = 5.42	BETTER NOW	287
(c) management and worker understanding of, and concern for health and safety (now as compared to 5 years ago)	WORSE NOW	mean = 5.58	BETTER NOW	288

M.03. Please assess whether the following aspects of health and safety in this workplace are worse now, or better now, than they were 12 months ago: (CIRCLE ONE NUMBER FOR EACH RATING)

		UNCHANGED		
(a) danger from accidents (now as compared to 12 months ago)	WORSE NOW	mean = 4.96	BETTER NOW	289
(b) danger from health hazards (now as compared to 12 months ago)	WORSE NOW	mean = 4.95	BETTER NOW	290
(c) management and worker understanding of, and concern for health and safety (now as compared to 12 months ago)	WORSE NOW	mean = 5.12	BETTER NOW	291

N. OVERALL EVALUATION

N.01. In your opinion, is your JHSC working, or not working in improving the protection and safety of workers? (CHECK ONE)

12.5%	The JHSC works extremely well and could not be better → (GO TO O.01)	
44.8	The JHSC is working well	
29.1	The JHSC is working adequately	292
12.6	The JHSC is weak, not working effectively	
.9	The JHSC is poor, cannot function at all	

N.02. To what extent would the following things improve your JHSC, to make it work better? (CHECK ONE BOX FOR EACH OF (a) TO (s))

	Would Not Help	Would Help A Little	Would Help A Lot	
(a) More representation on JHSC from management	70.1%	20.3%	9.6%	293
(b) More representation from workers	56.0	28.9	15.2	
(c) More support/input from workers generally	22.9	28.4	48.8	
(d) More support/input from management generally	33.7	30.4	35.9	296
(e) More regular and frequent meetings	58.1	23.2	18.7	297
(f) Better JHSC procedures (written agenda, minutes, etc.)	63.5	22.2	14.3	
(g) More training on safety issues	20.7	25.3	54.0	
(h) More training on health issues	22.4	25.2	52.5	300
(i) More time to study technical information	37.3	29.1	33.7	301
(j) Better inspection procedures	43.0	34.4	22.6	
(k) More or better in-house health and safety staff	47.9	27.0	25.1	
(l) More or better outside experts/advisors	40.9	32.6	26.4	304
(m) More information on health and safety matters	27.6	32.6	39.9	305
(n) More authority/independence for JHSC	43.8	22.8	33.4	
(o) More support by management to pay for recommendations	42.0	26.9	31.1	
(p) Stronger enforcement of legislation by Ministry of Labour	47.2	20.4	32.4	308
(q) More help/advice from Ministry of Labour	38.1	31.5	30.4	309
(r) Better labour/management relations	50.8	24.5	24.8	
(s) Better working relationships between worker and management JHSC members	49.7	27.0	23.2	311

O. COMPLETION OF THE QUESTIONNAIRE

O.01. Was this questionnaire completed with or without consultation with other JHSC members? (CHECK ALL THAT APPLY)

% 'Yes'		
8.3	Completed in consultation with management members	312
28.0	Completed in consultation with worker members	
64.7	No consultation with management or worker members	314

If there is a union or an employee association, please complete the attached sheet.

Thank you for taking the time to complete this important questionnaire. We would appreciate hearing about anything else you feel we should know about your joint health and safety committee. Please feel free to attach your additional comments to this questionnaire and return it in the postage-paid envelope provided.

P. IF THERE IS A UNION

P.01. Overall, how would you rate management's approach to collective bargaining in this workplace?

UNFAIR	mean = 4.38	FAIR	315
DISHONEST	mean = 4.44	HONEST	316
WEAK	mean = 4.61	STRONG	317

P.02. How many worker members of your joint health and safety committee (if any) hold any of the following positions in the union at the same time? (INDICATE NUMBER OF MEMBERS BESIDE EACH CATEGORY. IF NONE, INDICATE "0")

% indicating 1 or more

51.0 Hold position on local union executive 318

43.5 Hold position on negotiating committee 319

47.0 Hold any other elected or appointed union position 320

P.03. How frequently do worker members of your committee report to union officers?

48.2% Monthly or more often 321
15.3 Every three months
5.4 Every six months
31.1 Never

P.04. Does the union have any of the following resources to aid it in dealing with health and safety matters? (CHECK EACH THAT APPLIES)

37.1% Local or national union health and safety committee 322
13.4 Full-time health and safety representatives paid by employer under agreement
21.9 Full time union health and safety representatives
16.2 Outside health and safety specialists paid by union
55.6 Members of Union knowledgable about health and safety
17.5 None of the above 327

P.05. Please assess local union leadership as regards each of the following:

(a) leadership's general knowledge of the provisions of Occupational Health and Safety Act and regulations.	POOR	mean = 4.76	EXCELLENT	328
(b) leadership's understanding of and concern for safety hazards in this type of workplace.	POOR	mean = 5.30	EXCELLENT	329
(c) leadership's understanding of and concern for health hazards in this type of workplace	POOR	mean = 5.27	EXCELLENT	330
(d) leadership's contribution to the JHSC (e.g. identifying hazards, making recommendations etc.)	POOR	mean = 4.81	EXCELLENT	331

Ontario
Ministry of
Labour

Advisory Council
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and Occupational Safety

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